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Investigating Academic Writing: An Application of Syntactic Complexity Analysis

A Thesis Submitted in Partial Fulfillment of the Requirements for the MA Degree in Applied English Studies

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Abstract

This study examines the relationship between syntactic complexity and writing proficiency in EFL learners' texts across three academic levels: Intermediate, Upper-Intermediate, and Advanced. The study utilized the Tool for the Automatic Analysis of Syntactic Sophistication and Complexity to analyze the syntactic complexity indices detected in students' texts. These indices were statistically compared across academic levels and examined in relation to TOEFL writing proficiency descriptors to evaluate their diagnostic validity. The study conducted a close analysis of recurrent syntactic error patterns and developmental shifts in clause versus phrase density. It was guided by the Longman Grammar of Spoken and Written English model. The findings revealed a progression from clause-based to phrasal syntactic structures in advanced-level texts and a notable decrease in syntactic error frequency. The results contribute to the growing body of research on automated syntactic analysis in EFL contexts, highlighting the importance of integrating both structural and usage-based measures in writing assessment and instruction.

Key words: writing proficiency, syntactic complexity indices, syntactic errors, TOEFL norms, LGSWE model

Dedication

This thesis is dedicated to my family for their unwavering love and support, and my students and their families, whose trust and belief in me have been a continuous source of inspiration.

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CHAPTER ONE

Introduction

Chapter One
Introduction

1.1 Introduction

The growing dominance of English is particularly evident in Bahrain. It has shifted from a secondary language to a critical requirement for academic advancement and competitive employment in the 21st century. Academic writing competence is a core requirement for learners of English in higher education. As students progress through university-level studies, they are expected to demonstrate not only grammatical accuracy but also structural and rhetorical complexity aligned with academic norms. One of the key indicators of this progression is syntactic complexity. It is seen in the range and sophistication of grammatical structures used in writing. Previous research has shown that more proficient writers tend to use increasingly complex syntactic constructions, particularly within noun phrases and embedded clauses (Frempong, Kayi, & Ganu, 2023; Staples, Egbert, Biber, & Gray, 2023; Xu, 2019; Peng & Azmi, 2022).

This study examines the development of syntactic complexity in argumentative essays written by Bahraini university students at three academic levels: Intermediate, Upper-Intermediate, and Advanced. The aim is to explore how syntactic features vary across levels of writing ability and how they reflect learners' academic language development. To guide this investigation, the study draws on a usage-based approach to grammar, which considers language as shaped by frequency and context, and the language register framework outlined in the *Longman Grammar of Spoken and Written English (LGSWE)*, which distinguishes syntactic features

related to the academic register from other syntactic features associated with the conversational register, according to this study. These frameworks provide a basis for analyzing how syntactic complexity functions within the academic register expected of university-level writing.

1.2 Statement of the Study Problem

Proficiency in academic writing is a fundamental skill for learners of English as a Foreign Language (EFL), especially at the university level, where writing is a key means of demonstrating linguistic competence and academic achievement. Among the various indicators of writing development, syntactic complexity has been widely recognized as a strong predictor of writing quality and second language development (Ortega, 2003; Lu, 2010). However, despite the growing body of international research on syntactic complexity, there is a lack of empirical studies focused on localized EFL contexts, including that of Bahraini university-level students.

Most existing studies have been conducted in broader environments where English is a second language (ESL) or a foreign language (EFL). That is where the English language has not been examined for how its syntactic complexity develops across different academic levels. As a result, there is limited understanding of which syntactic features are most representative of writing proficiency in the Bahraini context, or how these features vary in real academic writing produced under standardized assessment conditions. Some learners of English in Bahrain complain that instruction is often limited to basic grammatical components, such as identifying verbs and nouns, with little emphasis on developing deeper syntactic understanding or applying it in written tasks. One learner reported that “they teach typical grade-1 stuff like verbs, nouns etc.… I still have

trouble understanding what they mean by 'nouns' and 'conjunction' when it comes to learning the language" (Reddit user, 2020), while another noted that "the majority of the class would not speak English and what is taught is basic stuff" (Reddit user, 2016). These perspectives reflect a broader concern that current instructional methods may not adequately equip students with the syntactic awareness necessary for academic literacy.

Wali (2017) claims that Arabic-speaking learners of English acquire grammatical structures in a developmental but non-linear way, with noticeable variation among learners. She argues that common errors committed by students include misuse of articles, prepositions, verb tenses, and punctuation. While several studies have examined these challenges in broader Arab contexts (e.g., Alsamadani, 2010; Shehata, 2008), research has been limited in specifically focusing on the types and patterns of syntactic errors made by Bahraini learners. Additionally, little attention has been given to how such errors are identified and addressed by instructors in Bahrain.

There is a clear gap in identifying the types of complex syntactic structures that Bahraini EFL learners typically use or struggle to use accurately at different stages of proficiency. This study aims to fill that gap by examining the syntactic errors that occur at various developmental stages in students' writing as they acquire more complex structures, progressing from one language proficiency level to a higher one. This highlights a need for empirical investigation into the nature of syntactic challenges faced by Bahraini students at different academic levels. Through this approach, the study aims to build a clearer picture of how syntactic complexity evolves and provide a foundation for improving writing instruction, assessment practices, and curriculum design for EFL learners in similar educational environments.

1.3 The Objectives of the Study

Given the established connection between syntactic complexity and academic writing proficiency in English as a Foreign Language (Kyle, 2016), this study is guided by the following objectives:

1. To analyze syntactic complexity features in students' argumentative essays across three academic levels, Intermediate, Upper-Intermediate, and Advanced, using the Tool for Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC).
2. To examine the relationship between syntactic complexity indices and TOEFL proficiency descriptors, and to assess how well these features align with overall writing quality as evaluated in a standardized academic setting.
3. To identify and interpret recurring syntactic inaccuracies in students' texts, and to understand structural challenges that may impede writing development.

Through these objectives, the study seeks to generate empirical, context-specific insights that can inform writing instruction, assessment, and curriculum design in EFL programs.

1.4 The Study Questions

In alignment with the objectives of the study, this research seeks to explore the following questions:

1. What syntactic complexity measures are most commonly applied by students at different academic levels (Intermediate, Upper-Intermediate, and Advanced)?

2. To what extent do traditional syntactic complexity indices predict holistic scores?
3. What are the prevalent types of syntactic errors found in students' writing across these academic levels?

By addressing these questions, the study aims to provide deeper insight into students' current writing abilities, identify patterns of syntactic development and error, and evaluate the predictive power of syntactic complexity measures in assessing writing proficiency. The answers to these questions will also inform the development of targeted instructional strategies to enhance writing outcomes in EFL contexts.

1.5 The Significance of the Study

The significance of the study lies in its data-driven, context-sensitive design, which employs the automatic analysis of Usage-based Indices extracted from students' papers using the Tool for Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC) and compares them against TOEFL standardized Descriptors, alongside a manual textual analysis of Academic vs. Conversational Register-Based Features. This dual approach enables a fine-grained investigation of how more sophisticated grammar develops in conjunction with writing. It also highlights register alignment as a key aspect of syntactic maturity, tackling areas of competence and difficulty at each writing level.

This study offers localized empirical evidence that identifies which usage-based syntactic indices are most closely linked to proficiency and pinpoints common areas of difficulty that persist even at higher levels. These insights reveal pedagogical blind spots and support targeted

instructional strategies, improved curriculum design, and more effective assessment tools.

1.5.1 Localizing International Proficiency Metrics:

The increasing inclusion of IELTS and TOEFL preparation programs in Bahrain's secondary education—particularly at the Grade 12 level—reflects a policy direction toward international proficiency standards (University of Bahrain, 2023; News of Bahrain, 2024). Nonetheless, these global assessments have yet to be formally incorporated into the national English curriculum or the Directorate of National Examinations' official frameworks (BQA, 2024). This disconnect between aspirational international benchmarks and current classroom assessments creates a critical space for empirical research. This study addresses a pressing gap in the evaluation of second language writing development in Bahrain by analyzing students' academic writing through syntactic complexity indices and comparing them against standardized TOEFL iBT descriptors (ETS, 2023). The findings offer practical value for local curriculum designers and teacher training programs, especially as the Ministry of Education intensifies its focus on teacher readiness for international testing systems (News of Bahrain, 2024). Furthermore, the study contributes to applied linguistic research by operationalizing syntactic sophistication metrics (Kyle, 2016) in a Gulf context—an area that remains significantly underexplored. The alignment of usage-based syntactic indices with proficiency descriptors supports more nuanced interpretations of learner development and assessment, ultimately informing pedagogy, policy, and materials design in Bahrain's evolving EFL landscape.

1.6 The Settings of the Study

This study investigates the developmental patterns of syntactic complexity in EFL academic writing, focusing on the distribution of writing proficiency indices across three levels: Intermediate, Upper-Intermediate, and Advanced. It aims to identify the syntactic complexity features that characterize students' writing as they advance through proficiency stages, using the *Tool for the Automatic Analysis of Syntactic Sophistication and Complexity* (TAASSC). The study also seeks to determine which syntactic structures indicate developmental progression in accordance with TOEFL proficiency standards and to examine the types of syntactic errors students produce at different writing levels based on the *Longman Grammar of Spoken and Written English* (LGSWE) framework. To ensure consistency and validity, the study analyzes 120 timed, in-class argumentative essays selected based on two criteria: (1) the student's first language is not English, and (2) the essays are original, unedited, and completed without external assistance.

1.7 The Definition of Terms

This study employs several terms that may seem ordinary or overlap with different concepts and theories. To clarify, below is a list of definitions for the key terminology used in this paper. *Syntactic complexity* refers to the degree of elaboration and structural sophistication present in written language, operationalized through quantifiable indicators that reflect the variety, depth, and coordination of syntactic structures (Ortega, 2003). *Syntactic complexity measures*, also known as *syntactic indices*, refer to the computational metrics used to evaluate syntactic variation and development. These indices, such as the mean length of T-units, the clause-to-T-unit ratio, and the use of complex nominals, are derived from tools like the Tool for the Automatic Analysis of Syntactic Sophistication and

Complexity (TAASSC). The term *grammatical features of register* is used in this thesis to denote the syntactic characteristics that distinguish one register from another, specifically academic versus conversational registers, as categorized by Biber et al. (2011). These features include, for example, the prevalence of passive constructions, nominalizations, and dependent clauses in academic prose, in contrast with the simpler, more paratactic structures typical of conversation. *TOEFL proficiency descriptors*, as outlined by Kyle (2016), are standardized linguistic profiles that represent the syntactic features associated with TOEFL holistic scores. These descriptors serve as reference points for evaluating learners' developmental levels of writing in terms of alignment with expected language performance at each level. *Writing levels* are referred to as proficiency levels in some studies when tested for alignment with TOEFL proficiency descriptors; in this thesis, they indicate the institutional classification of learners into Intermediate, Upper-Intermediate, and Advanced groups based on their academic levels. The present study employs a cross-sectional design, as recommended by Kyle (2016), to examine *syntactic development*, defined here as the measurable increase in the use of structurally complex syntax across writing stages. This approach is grounded in early syntactic development research (e.g., Hunt, 1965) and extends to contemporary corpus-based models.

1.8 The Organization of the Thesis

Chapter One introduces the study by outlining the background, research problem, purpose, significance, objectives, and research questions. It also defines key terms and situates the research within the broader context of English language education and second language acquisition (SLA) theory. Chapter Two presents a comprehensive review of the theoretical and empirical literature related to syntactic complexity,

second language writing, and EFL assessment practices. It draws on usage-based grammar models and register-features theory to contextualize the study. It identifies a research gap in understanding how Bahraini EFL learners construct syntactic complexity across writing levels. Chapter Three outlines the study's mixed-methods research design, which integrates quantitative syntactic analysis and a qualitative textual examination of learners' writing. Chapter four presents the findings of analytical components detailing the progression of syntactic complexity across writing levels, where syntactic measures are tested against TOEFL proficiency descriptors and frequently occurring syntactic errors are linguistically profiled across the different academic levels. Register-patterns of syntactic features are then interpreted through the lens of the Longman Grammar of Spoken and Written English (LGSWE). Chapter five then discusses the syntactic indices and inaccuracies, their distribution across the different levels, correlation with TOEFL proficiency descriptors, and intercorrelations within the usage-based indices, as well as the interpretation of findings in relation to the broader scope. Chapter six concludes the thesis by summarizing the main findings, limitations, and pedagogical implications. It offers recommendations for EFL writing instruction, curriculum development, and assessment, and suggests directions for future research into syntactic development in second language writing.

1.9 Summary

This chapter frames the thesis within Bahrain's intensifying reliance on English for academic and professional mobility and positions syntactic complexity as a core indicator of development in university EFL writing. It identifies a lack of empirical descriptions of how Bahraini learners' syntax develops across institutional proficiency levels, noting limited

attention to phrasal packaging and register-appropriate structure. As well as the appropriate style of writing according to standardized proficiency levels. The chapter sets three objectives: (a) to explore syntactic complexity at three academic levels using TAASSC; (b) to examine how these usage-based indices align with standardized proficiency levels and academic writing styles; and (c) to identify frequent syntactic inaccuracies that impede development.

CHAPTER TWO

Literature Review and Theoretical Framework

Chapter Two
Literature Review and Theoretical Framework

This chapter explores the theories and applications of syntactic complexity analysis across various writing levels. The discussion of this topic requires reviewing three interrelated fields of study: syntactic complexity, measures of syntactic complexity, and syntactic analysis of sentence complexity and sophistication. Each of these terminologies is based on specific theories and confronts a unique set of issues. Each section provides definitions, as well as a review of the theoretical bases and measures used to analyze syntactic complexity. Once an overall understanding of these concepts is set, the chapter narrows down the concepts to address the theoretical framework that best aligns with this type of analysis, discussing the linguistic model and assessment criteria adopted for analysis in this paper. This structure was employed to guide the reader from solid concepts and history to the more specific and empirical methodology.

2.1 Literature Review

2.1.1 Syntactic Complexity

Syntactic complexity is an extension of the construction of varied sentence structures. It encompasses the use of diverse and intricate grammatical structures in writing, highlighting the variety and sophistication of sentence constructions. It also serves as a crucial indicator of writing quality and cognitive development for ESL students. Higher syntactic complexity often signifies advanced language proficiency and the ability to articulate more nuanced ideas. It is a crucial concept in second language (L2) academic writing research. Larsen-Freeman (1978)

identified complexity as one of three essential constructs of language development, alongside accuracy and fluency.

Syntactic complexity refers to the diversity and elaboration of structural patterns found in language production (Ortega, 2003). Traditionally, it has been regarded as a formal attribute distinct from lexical development. Although measures of lexical sophistication and syntactic complexity are often employed concurrently to evaluate language development, they are typically considered separate dimensions rather than components of a single construct (Crossley, Cai, et al., 2012). Nonetheless, emerging research grounded in usage-based theories indicates a close interrelationship between the development of lexis and syntactic structures (Ellis & Ferreira-Junior, 2009b; Römer, 2009). According to this perspective, patterns of frequency and contingency are fundamental to understanding second language syntactic development, mirroring mechanisms observed in lexical acquisition. That is, syntactic and verb-construction combinations that appear more frequently in language use are generally learned earlier in the acquisition process.

These forms are generally regarded as less sophisticated compared to those that appear less frequently. Within this framework, syntactic development is best assessed through measures of frequency and contingency, rather than solely through structural indices such as subordination (e.g., T-units). Therefore, in this study, the term *"sophistication"* is employed to capture syntactic advancement as viewed through the lens of usage frequency and acquisition order. At the same time, *"complexity"* is reserved for describing the formal structural properties of syntax, such as the extent of subordination. Structures acquired earlier in the developmental trajectory are typically viewed as less sophisticated and structurally less complex than those acquired later.

Sophistication is thus aligned with relative complexity, whereas complexity reflects absolute syntactic elaboration (Bulté & Housen, 2012).

This study employs the term syntactic complexity to prevent any future misconceptions that might result from prefabricated sequences of sentence structures and lengths. Many studies have discussed the sequences and abstract concept of syntactic complexity, yet there is no officially established definition of this concept in the literature. In his book, A Generative Introduction to Syntax, Carnie (2021) describes it as sentences with complex syntactic relations that boggle the average English speaker. Prominent linguists, such as Morris and Crump (1982), Prater and Mayo (1984), Rousseau et al. (1993), and Radford (1997), among others, were able to make early observations about this linguistic phenomenon.

These observations suggest that Syntactic complexity is a structure that varies in length, ranging from compound words to two- or three-word collocations, and more extended sequences of clauses and phrases. Studies treated syntactic complexity as different systems. For instance, Gray (2015) found that soft disciplines rely more on clausal features, while hard sciences use more phrasal features. Lu et al. (2020) analyzed the complexity of rhetorical moves and steps in the introductions of research articles in the social sciences, noting varying levels of complexity. Wolfe-Quintero et al. (1998) claimed that the complexity of sentence structures has been operationalized at both the lexical and the syntactic levels.

Mastering the production of various sophisticated and syntactically complex structures is crucial for presenting a high-quality text. Complex sentence structures reflect sophistication in written texts (McNamara, Crossley, & McCarthy, 2021). They promote the compression of complex ideas within a single structure, demonstrating the effective employment of different constituents within a structure. Scholars invested in language

development claim that evaluators of text construction view a written text as of good quality and superiority to others if it's syntactically more complex (Beers & Nagy, 2009; Crowhurst, 1980a; Saddler & Graham, 2005; Stewart & Grobe, 1979). Researchers like Parkinson & Musgrave (2014), Biber et al. (2016), and Casal & Lee (2019) used syntactic complexity to aid the writing development, predicting levels of proficiency, and assessing the writing quality of students, making it a key focus for both researchers and educators in the field of language acquisition.

2.1.1.1 Writing Development

The investigation of syntactic complexity as a marker of writing development has gained substantial attention in applied linguistics, particularly in assessing student progression across academic levels. A growing body of research has demonstrated that more proficient writers—often operationalized through either academic standing or task performance—tend to employ increasingly complex syntactic structures. These include longer T-units, increased clause embedding, and more elaborate noun phrase constructions.

Shen et al. (2023) demonstrated that both academic year and language background significantly shaped syntactic development. In particular, advanced students and native English writers produced markedly denser nominal constructions and higher phrasal complexity, suggesting that writing sophistication evolves in tandem with academic progression. Casal and Lee (2019) analyzed research papers written by ESL undergraduates. They found that higher-rated papers consistently exhibited greater phrasal elaboration, especially in the use of complex nominals, longer clauses, and increased T-unit length. These indicators

differentiated high-performing students from their mid- and low-tier peers, affirming the link between syntactic complexity and writing quality. Similarly, Lei, Wen, and Yang (2023) conducted a longitudinal analysis of Chinese EFL university students over four academic semesters. Their findings revealed steady gains in sentence length, phrasal coordination, and syntactic density, highlighting the developmental nature of academic writing proficiency.

Research has also underscored the influence of academic experience on syntactic sophistication. Kuiken and Vedder (2018) compared L2 writers of Dutch, Italian, and Spanish and found systematic increases in subordinate clause use and noun phrase post-modification, associated with greater academic maturity. Saricaoglu and Atak (2022) reported that CEFR C1-level learners used more advanced syntactic forms, such as finite complement clauses and passives, than their B2-level counterparts—emphasizing developmental distinctions even within upper-intermediate to advanced categories. Lee et al. (2022), in their study of engineering students' technical writing, confirmed that syntactic complexity corresponded with academic performance tiers: higher-performing students utilized more varied noun phrase modifiers and exhibited deeper structural embedding.

The design of the present study investigates writing proficiency across academic years to examine writing development over time. It measures features found in each level, following the pattern applied in the literature; however, it employs fine-grained indices of TOEFL proficiency descriptor correlations, as suggested by Kyle (2016). The study will capture meaningful patterns that answer the questions: What syntactic complexity indices are found in students' writing as they progress? Do they represent different writing proficiency levels?

The results will either reaffirm previous claims that increased academic exposure and writing practice contribute to greater syntactic sophistication or reject it entirely, or partially. Ha (2022) found that Korean EFL writers showed phrasal-level growth but no significant differences in clause-level complexity across proficiency groups. Similarly, the Nagoya Interlanguage Corpus study (Sugiura et al., 2021) reported advancements in noun phrase elaboration across academic years; however, there were no consistent increases in subordinate clauses or embedding. On the other hand, Ortega, Norris, and Crossley (2023) found no reliable distinction among proficiency-linked groups. This implies that some syntactic measures may plateau rather than advance uniformly.

The findings challenge the assumption of uniform syntactic development and underscore the importance of selecting appropriate indices and contextualizing proficiency and academic level differences in analyzing learner writing. This study is guided by the hypothesis that the three educational levels tested are developmental, consisting of gradually more complex syntactic structures, and it tests this hypothesis through correlations.

2.1.1.2 Task Modality

Task modality has long been recognized as a key factor influencing the manifestation of syntactic complexity in second language (L2) production. Recent research has reinforced the idea that written language tasks tend to elicit more syntactically elaborate structures than oral ones, mainly due to differences in cognitive processing time, planning opportunities, and audience expectations. For example, Michel (2017) and Sasayama (2021) found that L2 writers produced more complex noun phrases and greater syntactic density in essays compared to their spoken

responses on similar topics, due to the extended planning time and ability to revise. Likewise, Lu, Ai, and Yan (2021) demonstrated that syntactic complexity indices, such as the number of complex nominals per clause and the mean length of clause (MLC), were consistently higher in writing tasks than in speaking. Among intermediate and advanced learners in particular.

In contrast, some studies argue that spoken language tasks requiring high-end syntactic elaboration can also showcase learners' syntactic complexity, such as storytelling, debates, and interviews. Tavakoli and Wright (2020) reported that oral narrative tasks prompted the use of more dependent clauses and subordination strategies, suggesting that certain types of speaking tasks can elicit higher-order syntactic constructions. Révész, Michel, and Gilabert (2016) highlighted that speaking tasks with a tighter task structure or higher cognitive demands can stimulate increased complexity, particularly in terms of clause chaining and adverbial subordination.

However, the differences in syntactic complexity between written and spoken outputs are purely a matter of task modality, where students can't observe their products, edit them, or reflect upon their work, which reflects language competence. Whilst speaking, although considered academic and showing language competency, the competence could be affected by the nature of the task, where students may lose track of their thoughts, stutter, and tend to forget what they were saying, which impacts their speech and evaluation of language competence. Students speaking in academic contexts typically don't have the opportunity to proofread or edit their arguments; instead, they are evaluated immediately. Therefore, writing samples were selected for this study as more suited for analyzing a high-end syntactic elaboration.

2.1.1.3 Task Type

Syntactic complexity is not only shaped by task modality but also by the type of task or genre assigned to it. Current research has increasingly emphasized that different task types, such as argumentative essays, descriptions, narratives, or problem-solving tasks, differentially influence the syntactic structures produced by L2 writers. Studies like those by Lu and Ai (2017), Révész, Michel, and Gilabert (2016), and Sasayama (2021) have demonstrated that argumentative writing, in particular, tends to elicit more complex syntactic structures, especially in terms of clause embedding, passive constructions, and complex nominals. This is likely due to the cognitive demands of persuasion, explanation, and logical reasoning embedded in argumentative writing tasks.

Similarly, Yoon and Polio (2017) observed that narrative writing tends to yield less syntactic density than argumentative writing, as it favors temporal sequencing and simpler coordination strategies. Bulté and Housen (2020) also found that descriptive tasks elicit greater noun phrase elaboration, whereas problem-solution essays showed more diversity in clause subordination and adverbial clauses. In their meta-review, Michel (2022) argued that task design should align with the linguistic features under analysis; therefore, if advanced language features are the focus, tasks demanding higher cognitive load and structured planning, such as argumentative writing, would serve this purpose best.

Argumentative writing was selected for the current study, considering it is more likely to trigger advanced syntactic constructions aligned with the indices generated by TAASSC and TOEFL descriptors. This was done to allow for accurate capture of developmental patterns across academic levels by eliciting the type of complexity that reflects both

proficiency and academic maturity. Researchers such as Biber et al. (2016) and Yoon & Polio (2017) argue that using a standardized prompt enables control over topic-induced variance, making it easier to attribute differences in syntactic complexity to learner ability rather than task variability. However, this study challenges this claim by testing the alignment of indices found in the different writing levels, which feature various argumentative tasks assigned to students across three academic years. While some researchers advocate for unifying argumentative writing tasks to ensure comparability across proficiency levels, others argue that such uniformity can obscure natural variations in genre familiarity, developmental stage, and academic expectations. Rather than controlling the task type, this design reflects authentic curricular progression, allowing for the observation of developmental patterns as they naturally unfold in educational settings. Such an approach supports claims by Gilabert et al. (2021) and Ortega (2015), who emphasize the importance of capturing real-world variability in task types to better understand language development over time.

2.1.2 Syntactic Complexity Analysis

The analysis of syntactic features that signal linguistic complexity and sophistication requires identifying parts of speech (POS) within a sentence, as well as examining the syntactic relationships among these elements, typically through constituency and dependency structures. The analysis employs different approaches depending on the structure being analyzed (Burton-Roberts, 2016). Since words and phrases belong to various categories, the status of each unit within a sentence can only be determined through empirical analysis. The relationship between each grammatical feature has been studied using both manual and automatic linguistic measurements.

The assessment of syntactic complexity has been conducted manually for many years. The process has contributed to the widespread reliance on coarse-grained measures such as the mean length of sentence and T-unit (Kale, 2016). However, manual annotation is not only time-consuming but also subject to human error and inconsistency (Higgins, Xi, Zechner, & Williamson, 2011; Lu, 2010). These limitations have led to increasing calls for the automation of syntactic analysis (Bulté & Housen, 2012). Recent studies in computational linguistics and natural language processing (NLP), notably those introduced by Chen and Manning (2014) and Klein and Manning (2003), have enabled the creation of tools capable of performing detailed and large-scale syntactic analysis (e.g., Lu, 2010; McNamara et al., 2014).

2.1.2.1 Tools for Syntactic Complexity Analysis

Automated text analysis tools utilize natural language processing and machine learning to extract SCMs. The use of automated text analysis tools has become increasingly efficient with technological advancements over the past two decades. Automatic complexity analysis tools provide reliable metrics for measuring syntactic complexity, aiding academic writing rsearch. These tools include the L2 Syntactic Complexity Analyzer (SCA), which calculates indices like mean clause length and dependent clauses per T-unit, the Biber Tagger Automated Tool, which identifies various grammatical structures, and the Coh-Metrix Automated Tool, which measures clause incidence and noun phrase modifiers. According to Kyle (2016), none of the tools mentioned meet the criteria for an ideal tool due to the strengths and weaknesses of the three commonly used automatic analysis tools listed in Table 1 below. The tools are assessed across four critical dimensions: accuracy, range of indices, availability, and portability—these present essential considerations for selecting

computational tools for text analysis. Clear distinctions were observed across the tools in terms of availability and portability. The Biber Tagger is reputed for its high accuracy and comprehensive range of fine-grained indices. However, according to the researcher, it suffers from limited availability and portability as it is not widely distributed, and its reliance on an outdated programming language hinders its integration into modern research workflows. Similarly, Coh-Metrix incorporates a highly accurate parser and offers both broad and fine-grained indices. Its functionality is constrained by sparse index coverage and the lack of batch processing, which limits its scalability for larger corpora.

In contrast, SCA demonstrates significant practical advantages. It maintains a high level of reported accuracy and supports both fine and large-grained indices. What distinguishes SCA from Coh-Metrix and Biber Tagger is its wide availability, support for batch processing, and high portability. In addition, considering that it's facilitated by its development in widely adopted programming languages like Python and Java, makes it particularly suited to large-scale or iterative research projects that require consistent and automated analysis.

Table 1. Strengths and Weaknesses of the Automatic Analysis Tools (Kyle, 2016)

Tool	Accuracy	Range of indices	Availability	Portability
Biber Tagger	Reported to be high, but exact figures are unknown	Large range of fine-grained indices	Not Widely Available. Researchers can request for texts to be processed.	Not Portable. Currently implemented in an obsolete programming language
Coh-Metrix	Not directly reported, but uses highly accurate parser	Some large and fine-grained indices, but relatively sparse coverage	Available online, but no batch processing.	Not portable as a desktop tool. Uses Charniak Parser.
SCA	Very High	Some fine-grained and large-grained indices. Relatively sparse coverage	Widely available and allows for batch processing.	Very Portable. Utilizes Python and Java

The table highlights a persistent challenge in computational linguistics, namely, balancing analytical sophistication with usability. While the Biber Tagger and Coh-Metrix contribute valuable depth and precision, their technical limitations may deter broader adoption. However, SCA offers a more pragmatic solution, particularly for researchers who prioritize efficiency, scalability, and ease of integration. Subsequent research in the field has continued to adopt and refine the Syntactic Complexity Analyzer (SCA) indices for broader analytical purposes. SCA became a foundational resource for later tools seeking to advance syntactic complexity analysis due to its high accuracy, large-grained syntactic scope, and established validation (Lu, 2011). The Tool for the Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC) represents a significantly advanced automatic analysis tool that has integrated the original 14 syntactic complexity indices as one of four major index categories. As Kyle (2016) explains, “TAASSC includes four groups of indices that can be categorized based on the type of parser used in their operationalization. The first group comprises SCA indices. SCA employs

the Stanford Parser (Klein & Manning, 2003) and Tregex (Levy & Andrew, 2006) to count structures." (p. 50), confirming the tool's direct incorporation of SCA methodology for its high functionality.

The SCA functionality was implemented within TAASSC to enable researchers to extract both established complexity measures and newer indices of syntactic sophistication, as well as fine-grained phrasal and clausal structures, within a single tool, rather than operating as an external add-on. These indices are calculated using advanced natural language processing techniques, such as constituency parsing via the Stanford Parser and syntactic pattern matching through Tregex, as described in Kyle (2016). This integration reflects the continued influence of SCA in the field and highlights the evolving innovation in syntactic analysis tools.

2.1.2.1.1 The Tool for the Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC)

TAASSC was developed to assess a wide array of fine-grained syntactic complexity and sophistication features in student writing. The tool categorizes its indices into four main groups, each defined by the type of parser employed to generate the syntactic measures. All indices analyzed by TAASSC are found in Appendix B.

The first group draws on the syntactic complexity indices featured in Lu's (2010, 2011) Syntactic Complexity Analyzer (SCA). It comprises 14 measures based mainly on earlier frameworks by Wolfe-Quintero et al. (1998) and Ortega (2003). The source document provides details on these indices, along with brief descriptions (See Appendix B). The second group comprises fine-grained measures of clausal complexity, consisting of 31 indices. Of these, 29 evaluate the average number of clause-level

structures. The third category encompasses indices for phrasal complexity, including metrics for seven types of noun phrases and ten kinds of dependent phrases. The fourth group comprises frequency-based measures of syntactic sophistication, grounded in usage-based language learning theories (e.g., Ellis, 2002a; Goldberg, 1995; Langacker, 1987). TAASSC calculates 15 core sophistication indices, which expand into 38 variations and ultimately result in 190 total indices by referencing five subcorpora from the Corpus of Contemporary American English (COCA): academic, fiction, magazine, newspaper, and general written text. COCA was selected as the reference corpus due to its size (~500 million words), recency (1990–2012), and diversity in genre, making it a more suitable representation of contemporary American English than the older British National Corpus (BNC). For the last three groups (clausal complexity, phrasal complexity, and syntactic sophistication), TAASSC uses the Stanford Neural Network Dependency Parser (version 3.5.1) and a Python-based XML parser. This dependency parser offers high accuracy and speed, generating detailed syntactic relationships (e.g., subject, object) in XML format, which is then processed through Python scripts.

In sum, TAASSC integrates modern developments in second language acquisition research (e.g., Bulté & Housen, 2012; Ellis et al., 2014), L2 writing studies (e.g., Lu, 2011; Ortega, 2015), and cutting-edge natural language processing tools (e.g., Chen & Manning, 2014). It includes established measures of syntactic complexity (Lu, 2011; Ortega, 2003; Wolfe-Quintero et al., 1998), as well as detailed indices at both the clause and phrase levels (Norris & Ortega, 2009). Additionally, TAASSC incorporates frequency-based indices that align with usage-based theories of language development. The tool is open-source, easy to use, compatible

with all major operating systems, and supported by a highly accurate parsing engine.

2.1.3 Syntactic Complexity Measures

Syntactic Complexity Measures (SCMs) involve the combination of linguistic units to form more complex structures. These measures are essential in writing research and have been the focus of extensive investigation over the past five decades (Jagaiah, 2020). Despite their importance, Wolfe-Quintero et al. (1998) and others have highlighted inconsistencies in the definition of SCMs. For example, definitions of a "clause" differ across studies; some describe it as containing a subject and a finite verb, while others include non-finite clauses as well. This variation complicates cross-study comparisons. For instance, the sentence "My goal is to run a marathon" would be counted as a single clause in the former case, but as two clauses in the latter.

SCMs tend to obscure whether syntactic development follows a linear progression. Although learners generally produce longer clauses as their writing proficiency increases, the syntactic constructions they employ to achieve this expansion may vary across developmental stages. Certain structures appear to be more dominant at specific points in development, while others are less so. This variability highlights the importance of employing fine-grained syntactic complexity indices. SCM offers a more nuanced depiction of syntactic development and provides more detailed analyses essential for accurately exploring the interplay between syntactic complexity and growth in writing proficiency. Further complicating matters, some studies fail to clearly define their syntactic structures, making comparisons even more difficult. The definition inconsistency highlights the need for precise and thorough interpretations, as even seemingly straightforward measures can become ambiguous without clear operationalization (Crossley & McNamara, 2014). As a result, researchers

have aimed to identify syntactic measures based on the functional properties of language from a scientific perspective.

Numerous SCMs have been introduced and applied in L2 writing. However, only a few have been used consistently across studies. In his paper *Measuring Syntactic Development in L2 Writing,* Kyle (2016) defines the most widely used syntactic complexity measures introduced by Wolfe-Quintero et al. (1998), known as SCA measures, which were also utilized in his automated tool for fine-grained complexity analysis, TAASSC, found in Appendix B.

Syntactic complexity measurements vary according to developmental levels (Norris & Ortega, 2009). Research on the most commonly examined syntactic complexity measures was argued due to the variety of syntactic complexity measures analyzed across different studies, as highlighted in research syntheses on syntactic complexity. Determining which components of syntactic complexity are linked to proficiency and which measures to use demands a detailed scholarly analysis.

According to Bulté & Housen (2012) and Norris & Ortega (2009), syntactic complexity primarily relies on length-based measures and the subordination of overall complexity. These measures faced increasing criticism regarding the use of global length measures and subordination ratios to capture a text's entire linguistic proficiency level. Scholars such as Alexopoulou et al. (2017) and Michel (2017) have suggested the use of additional measures to illustrate the syntactic complexity of different developmental levels.

Norris and Ortega (2009), among others, suggested considering measures of coordination and phrase-internal complexification, like the number and length of post- or pre-modifying noun phrases. While

complexity through coordination and subordination mostly occurs at the beginning and intermediate stages of L2 learners' writing, advanced L2 learners appear to produce phrasal complexity measures more frequently (Ortega, 2003). Recent studies recommend using more fine-grained measures that address different types of subordination and differentiate the use of nominal subordination from the use of subordination via subject/object relative clauses (Kyle & Crossley, 2018).

Lu (2014) concluded that the best measures of syntactic complexity for distinguishing different levels of proficiency "are complex nominals per clause (CN/C) and mean length of clause (MLC), both of which not only discriminated two or more adjacent levels but also increased linearly across all four levels" (p. 56). However, the number of dependent clauses per clause, clauses per sentence, and dependent clauses per T-unit dropped significantly when the learners' proficiency level increased (Lu, 2014). Consequently, Lu (2014) noted that as students become more proficient, phrasal rather than clausal complexity is more prominently featured in their essays. Despite their differences in measuring the features of complexity, Lu's (2014) and Biber et al.'s (2011) studies seem to converge on some significant points, most notably that phrasal complexity is a better measure of syntactic development in learner writing. Despite this, Biber et al. (2011) call for further research into their proposed developmental index.

Hunt (1965b) established the concept of the T-unit as a key indicator of writing development, asserting that the length of T-units correlates strongly with writing maturity. He observed that more proficient adult writers differ from younger, less experienced writers—typically those in grades 4 through 12—primarily in the length and complexity of their clauses. The most notable increase in T-unit length was attributed to expanded nominal structures, with relatively minor growth in the use of

verb auxiliaries and main verbs. As students progress, they increasingly elaborate noun phrases by incorporating noun clauses and other clause-like constructions. In contrast, younger writers tend to produce brief, isolated units that reflect limited grammatical development. Over time, maturing writers learn to eliminate redundant expressions, reduce verbosity, and express ideas more concisely. Hunt (1965b) concluded that by the time students complete their secondary education, their average T-unit length increases by nearly 60% compared to their early writing.

2.2 Theoretical framework

This study adopts a comprehensive framework of language acquisition combining an automated syntactic analysis of usage-based indices at different writing levels (TAASSC, 2016), a manual syntactic analysis of Academic and Conversational register-features and errors produced by learners at each level (LGSWE, 2011), and a standardized proficiency correlation test against TOEFL scores descriptors (Kyle, 2016).

2.2.1 Usage-Based Model of Cognitive Grammar

The integrated framework of the study reflects the cognitive model of grammar (Figure 1). This model provides a structured framework that encompasses the research questions addressed in this study, enabling a multi-dimensional examination of syntactic complexity development features across writing levels. The usage-based perspective to the model posits that language acquisition aligns with general experiential learning processes, whereby repeated exposure to and use of linguistic input facilitates learning. This view maintains that learners develop language proficiency through direct interaction with language in meaningful contexts (Kyle, 2016).

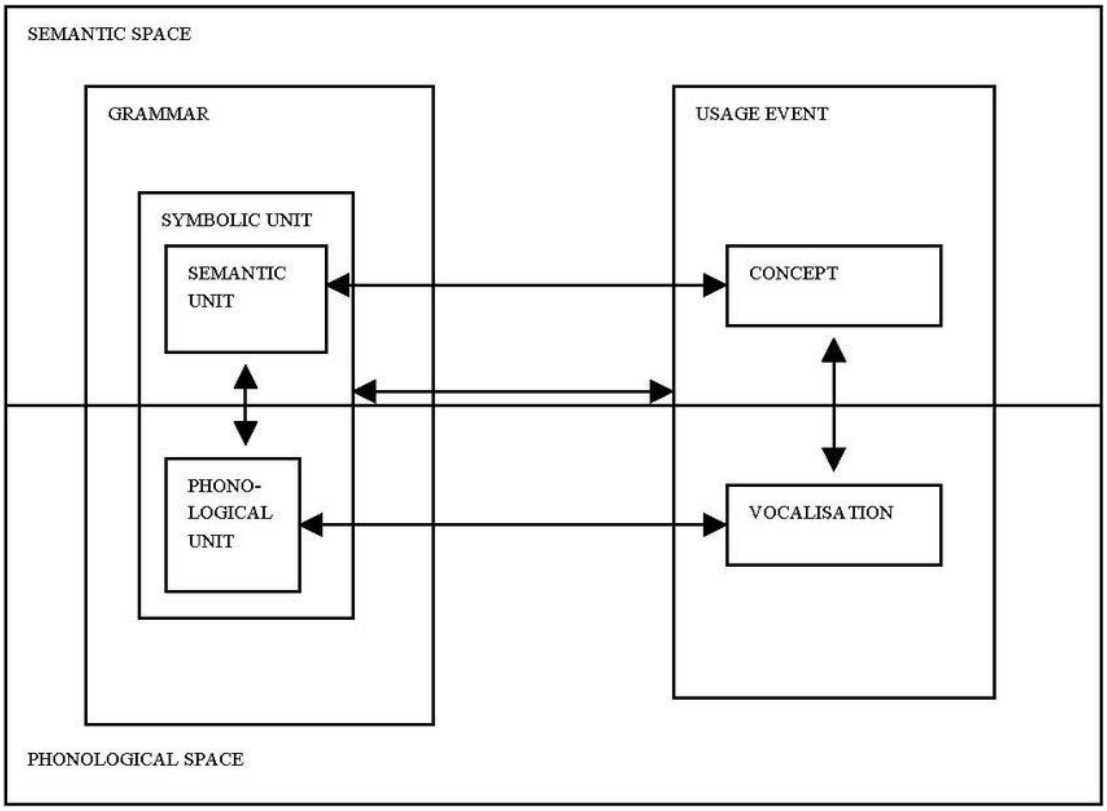


Figure (1): The Cognitive Model of Grammar (Langacker 1987: 77)

This grammar model was selected for its relevance in capturing the developmental characteristics of second and foreign language acquisition, which are central to this investigation. The choice of framework is based on a synthesis of empirical insights from prior research on syntactic development, including the work of Thongyoi and Poonpon (2019), Kyle (2016), and Biber et al. (2011).

The model is grounded more in empirical functionality than abstract theory. It highlights the role of contextual interpretation in grammar, emphasizing that linguistic forms are shaped by and must be interpreted through the communicative contexts in which they occur according to the Longman Grammar of Spoken and Written English (Biber et al., 2011). Langacker (2006) argues that achieving fluency involves more than mastering grammatical rules; it requires acquiring a broad repertoire of fixed and conventional expressions tailored to real-life communicative

circumstances. Only by managing this vast inventory of structured expressions can speakers produce fluent and complex language in real-time.

Kyle (2016) observed that adult L2 learners tend first to acquire formulaic or low-variability constructions, which over time evolve into more abstract form–meaning associations. He proposed that input frequency and form-function contingency have a significant influence on the trajectory of construction learning. However, what remains uncertain is whether these developmental patterns persist at more advanced writing levels or across different modalities (e.g., writing vs. speaking), and whether they apply across all syntactic indices. To address these unresolved issues, Kyle outlined a research agenda that this study closely follows: (1) systematically identifying the full range of constructions in a corpus; (2) developing automated syntactic indices that reflect usage-based patterns grounded in frequency; and (3) testing the validity of these indices in reflecting syntactic development and aspects of change over time.

2.2.2 LGSWE Syntactic Framework

The *Longman Grammar of Spoken and Written English* (LGSWE), by Biber et al. (1999), offers a register-based framework for analyzing grammatical features across various communicative contexts. It is built on empirical findings from a large corpus of English. It distinguishes how grammatical features vary systematically between registers, describing a continuum from conversation-oriented to writing-oriented language.

High interactivity, simple clause coordination, shorter clauses, and lower nominal density are characteristic of the conversational register. This register favors grammatical structures that support real-time communication, such as frequent use of pronouns, finite clauses, and minimal embedded structures. The academic register is marked by

structurally dense noun phrases, extensive use of pre- and postmodifiers, nominalizations, and complex embedded clauses. These features facilitate the packaging and precision of information, aligning with the communicative demands of written, expository, and specialized discourse. Between these two poles, the authors identify intermediate registers, exemplified by fiction and news reportage. These occupy a transitional position, blending spoken-like features, such as simpler coordination and more finite clauses, with emerging written-like characteristics, including increased phrasal elaboration, nonfinite clauses, and more complex nominal structures.

Scholars in second language writing research used LGSWE to map developmental shifts in learner grammar tracking movement from clausal features typical of conversation towards phrasal constructions characteristic of academic writing. Lu & Ai (2015) employed LGSWE-inspired measures to compare college-level writers with diverse L1 backgrounds by examining growth in noun phrase modifiers versus clausal constructions. More broadly, corpus-based investigations in Iranian and Korean EFL contexts have documented non-linear developmental trajectories, where learners gradually increase their use of noun modifiers and phrasal complexity while reducing reliance on lower-level clausal features.

The present study employs this register continuum as a conceptual framework. It is narrowed to include the syntactic features relevant to distinguishing academic from conversational writing, interpreting the distinct features observed at each educational level according to the register-based features in the model (See Appendix C). The three levels of learners are hypothesized to rank at different registers, assuming that the lowest level of learners (IL) under examination exhibit patterns comparable to the register that describes less proficient language users

(conversational register), the highest level of learners (AL) show patterns similar to the more proficient language users (academic register). The learners at the middle (UIL) produce a mixture of both features, indicating transition.

Framing these three writing levels within the LGSWE continuum underscores the gradual nature of syntactic development in L2 writing. It situates the observed progression in a broader, empirically supported model of register variation. This adds to the Bahraini context, considering it a context that has received limited attention regarding students' competence in using academic language. According to some studies, Bahraini EFL learners often struggle with formal academic writing due to limited exposure and practice (Al-Bakrawi, 2019; Hasan & Akbar, 2021). It is essential to note that students' primary input in Bahrain is from social media, YouTube, and television, which results in students performing at the conversational level at the beginning of a writing course or at their first year of an intensive writing program or English major.

2.2.3 TOEFL Standardized Proficiency Descriptors

The TOEFL proficiency descriptor framework provides standardized linguistic benchmarks for assessing academic writing performance, developed through large-scale, empirically rated learner corpora. Kyle (2016) demonstrated that specific syntactic complexity indices—such as phrasal elaboration, mean length of T-unit, complex nominals, and clause depth—correlate significantly with TOEFL iBT writing scores. These correlations support the use of these indices as valid, usage-based indicators of L2 writing proficiency.

In syntactic complexity research, this framework is commonly employed by comparing learners' writing samples with the syntactic

profiles characteristic of high- and low-scoring TOEFL essays (Kyle & Crossley, 2018; Thongyoi & Poonpon, 2020). Studies using this model have shown that more proficient writers tend to rely on structurally dense noun phrases and embedded constructions. In contrast, less proficient writers tend to rely more on clause coordination and basic syntactic structures. Tools like TAASSC (Kyle, 2016) automate the extraction of these indices, allowing researchers to evaluate syntactic development quantitatively and align it with proficiency bands derived from standardized TOEFL scoring data.

In the present study, this framework is integrated by analyzing the syntactic complexity indices produced from student writing at three institutional writing levels and comparing them to syntactic benchmarks established in TOEFL iBT performance bands (see Appendix A). This alignment facilitates a more objective, data-driven assessment of syntactic development across levels, enabling the study to determine whether learners' grammar use aligns with international academic writing norms. This integration is especially relevant within the Bahraini EFL context, where recent educational initiatives have introduced IELTS and TOEFL preparation tracks into secondary education, particularly in Grade 12 (University of Bahrain, 2023; News of Bahrain, 2024). However, these international assessments remain absent from the national English curriculum and the official frameworks established by the Directorate of National Examinations (BQA, 2024). As a result, a misalignment exists between instructional objectives and the linguistic demands of global proficiency standards.

TOEFL-aligned descriptors provide insight into how closely students' academic writing aligns with global expectations. By situating syntactic complexity within an international benchmark framework, the

study contributes empirical evidence that can inform teacher training, curriculum development, and assessment practices while localizing international proficiency metrics. It also highlights the importance of syntactic development as a measurable and teachable component of academic writing readiness, particularly in contexts such as Bahrain, where international benchmarks are present in policy discourse but not yet fully integrated into classroom practice.

2.3 Summary

This chapter surveys and synthesizes the literature and theoretical foundations for analyzing syntactic complexity in L2 academic writing. It reviews evidence that development trends from clausal to phrasal packaging as proficiency rises, while cautioning that coarse, length-based ratios and subordination counts can obscure growth unless indices are functionally interpreted. The chapter then motivates a written, argumentative task design to elicit advanced structures, and shows how task modality and genre systematically shape the complexity learners produce. Methodologically, it traces the shift from manual annotation toward reliable automated analysis, comparing tools and justifying TAASSC for its integration of classic SCA measures, fine-grained clause/phrase indices, and frequency-based sophistication metrics grounded in large reference corpora. Finally, the chapter articulates an integrated framework: (a) a usage-based cognitive model of grammar to explain learning mechanisms; (b) LGSWE's register continuum to interpret observed features as movement from conversational to academic patterns across levels; and (c) alignment with TOEFL iBT descriptors to benchmark developmental gains against external performance standards.

CHAPTER TREE

Methods and Procedures

Chapter Three

Methods and Procedures

This chapter outlines the methodological framework employed to investigate the development of syntactic complexity in the academic writing of Bahraini EFL university students. Grounded in a corpus-based mixed-methods design, the study integrates both quantitative and qualitative approaches to provide a comprehensive account of how syntactic structures evolve across three academic levels. The chapter details the procedures for data collection, the analytical tools and techniques applied in both components of the study, and the theoretical models used to interpret the findings. By combining automated syntactic analysis with manual textual interpretation, the methodology aims to reveal both measurable patterns and functional characteristics of syntactic development in learner writing.

3.1 Research Design

This study employed a mixed-methods research design, incorporating both quantitative and qualitative analyses. It investigates the development of syntactic complexity in the academic writing of Bahraini EFL university students. It examined how syntactic structures evolve across three levels of writing proficiency. The research was designed to explore the extent to which syntactic complexity reflected students' writing proficiency and how these structures aligned with recognized standards of academic writing performance. This approach enabled the assessment not only of the frequency and type of syntactic structures employed by learners, but also of the functional role those structures played in meeting the stylistic and rhetorical demands of academic writing. By combining quantitative corpus analysis with qualitative textual interpretation, and

grounding both in established theoretical models, the study aimed to generate context-sensitive insights into the progression of syntactic complexity in EFL learner writing.

3.2 The Sample of Subjects and Data

The research sample consisted of 120 university students' essays representing progressive levels of writing courses: an intermediate level, an upper-intermediate level, and an advanced level. The levels of writing competence were determined based on the level of the courses in which they were enrolled at the time of the study. Following Hunt's (1965) approach to syntactic complexity analysis, writing samples were collected from different course levels to ensure a balanced dataset that allows for meaningful comparisons across group levels. Hence, students at the Intermediate level are second-year admissions, students at the Upper-Intermediate level are third-year students, and those at the Advanced level are seniors. The levels were hypothetically labeled to evaluate the overall performance of EFL university students in Bahrain and monitor their language development in comparison to TOEFL descriptors.

To maintain the integrity and comparability of the dataset, specific selection criteria were applied. All participants were required to be native speakers of Arabic with English as a foreign language, ensuring a uniform L1 background. Only complete, legible essays that met the minimum word count of 200 words required by the assessment rubric were included in the analysis to ensure enough input for machine processing, comparable to other levels of performance.

Essays were produced under standardized, in-class, timed conditions to ensure that all samples were original, unaided, and composed in controlled testing environments. The data of the study were collected from a sample of subjects as part of their course assessment. The texts collected

were all argumentative, featuring various topics such as the addiction to soft drinks, the employment of housemaids, and the widespread popularity of TikTok. The genre was chosen for its relevance to academic writing, as it's known to encourage contextual elaboration and elicit complex syntactic constructions.

The sample was considered appropriate for examining syntactic development across the three writing levels. It reflected a progressive range of academic writing competence, representative of EFL learners in the Bahraini university-level context. The stratified nature of the sample also allowed the study to explore both developmental patterns and proficiency-related features in syntactic complexity and writing performance.

3.3 Data Analysis

The data analysis in this study followed a corpus-based mixed-methods approach integrating both quantitative and qualitative methods to investigate the development of syntactic complexity in EFL writing. Three primary techniques were employed for data analysis: an automated textual analysis using the Tool for Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC), a TOEFL correlational test to evaluate the predictive power of syntactic indices extracted from each level of writing, and a manual textual analysis based on the Longman Grammar of Spoken and Written English (LGSWE).

3.3.1 The Tool for Automatic Analysis of Sophistication and Complexity

The tool for automatic analysis of syntactic sophistication and complexity (TAASSC) by Kyle (2016) was used to process students' essays level by level. The tool automatically generates a wide range of structural indices, including TAASSC indices, SCA indices, and syntactic components of the list of essays from each level entered for processing (See

Appendix B). The analysis focuses on identifying the most frequently occurring syntactic features at each level of processing. The extracted data were compiled and subjected to descriptive and inferential statistical analysis software to evaluate the syntactic features found in each writing level.

3.3.2 TOEFL Correlation Test

The indices extracted from TAASSC were compared against TOEFL rubric descriptors to measure the relationship between syntactic complexity indices and standard deviation indices that align with them from Kyle's framework. Following Kyle's (2016) approach to calculating the predictive validity of the Standard Deviation indices of TOEFL descriptors (e.g., TOEFL iBT scores), this study evaluates the predictive power of syntactic complexity indices found across the three levels of writing.

Pearson correlation coefficients (r) were computed to determine the strengths, weaknesses, and null correlations. R^2 values were examined to assess the extent to which specific features explained variance in writing levels, thereby evaluating the predictive power of syntactic complexity in relation to academic writing performance. This statistical measure ranges between −1 and +1, where values close to +1.00 indicate a perfect positive linear relationship, values near −1.00 reflect a perfect negative linear relationship, and a value of 0.00 suggests no linear correlation.

The square of the Pearson correlation coefficient (r^2) was also calculated to determine the proportion of variance in the dependent variable that is explained by the independent variable. (R^2 (coefficient of determination) = r^2) represented the proportion of variance explained by the syntactic indices found at each level. This value represents the percentage of the variation in writing level that a given syntactic feature can explain. Each syntactic index was tested against the assigned indices

for TOEFL holistic scores using Pearson's correlation. Stronger R-values and higher R^2 values suggest stronger predictive relationships.

3.3.3 LGSWE Linguistic Profiling

The Longman Grammar of Spoken and Written English Model (Biber et al., 1999) provides a corpus-based account of syntactic variation across different registers: Academic, Conversational, Fiction, and News. To guide the manual analysis of students' writing samples, only the features of the Academic and Conversational registers were extracted. In addition, to assess the structural syntactic features of the texts, lexical, semantic, and discourse-level features were excluded. The focus of analysis was solely on syntactic features, including clause types, passive constructions, noun phrase complexity, nominalizations, nonfinite clauses, prepositional phrase use, and grammatical accuracy in areas such as article usage and subject–verb agreement. This framework was employed to evaluate whether students' writing showed a developmental progression from features characteristic of conversational discourse toward structures typically associated with formal academic writing, such as complex noun phrases, subordination, and nominalization.

The identification of syntactic errors was based on syntactic features strongly associated with either the conversational or academic register. Each element was operationally defined with distinct structural boundaries to ensure clarity and avoid overlap with other features. For example, run-on sentences were coded strictly as independent clause combinations lacking appropriate subordination or coordination markers, a feature characteristic of the conversational register. Whereas, over-embedding referred exclusively to the excessive layering of dependent clauses within a single sentence, reflecting dense academic style. A deviation was recorded when a student's sentence diverged from the expected structure of its corresponding register. This ensured that no instance of error could

be classified under multiple categories, thereby preserving mutual exclusivity in coding and minimizing subjective interpretation (see Appendix C).

To ensure analytical reliability, a syntactic occurrence was considered frequent only if it was detected at least three times across the corpus (Aybek, 2025). Corpus-based research recommends this measurement in small-scale corpus research to ensure that linguistic occurrences are not idiosyncratic to a single text but represent patterns that recur across multiple samples (Römer, 2022). This is required to establish consistent patterns rather than isolated anomalies (O'Keeffe & McCarthy, 2021). Datasets under approximately 100,000 words, designed for in-depth analyses of specific linguistic features, qualify as small-scale corpus research (Lozano & Mendikoetxea, 2013). Given that the sample comprises 140 texts, totaling approximately 25,000–50,000 words, it meets the definition of a small-scale corpus for which analytical measurement is applicable (Flowerdew, 2012).

3.4 Integration of Data

Both quantitative and qualitative tools were employed to capture a comprehensive scope of syntactic development at the tertiary level in Bahrain. The automated analysis provided measurable evidence of usage-based syntactic features, the correlations offered insight into the proficiency level of students according to international standards, and the manual analysis provided a contextual understanding of structural use and register appropriateness. Thus, it presents part of the nature of syntactic complexity as students get exposure to academic writing at different levels, their performance, and the syntactic challenges they face.

3.5 Summary

This chapter outlines a corpus-based mixed-methods approach for investigating the development of syntactic complexity in the academic writing of Bahraini EFL university students. The sample comprises 120 timed, in-class argumentative essays from three different course levels: Intermediate, Upper-Intermediate, and Advanced. Inclusion required an Arabic L1 background and a minimum of 200 words to ensure comparability and machine-processable input. Analytically, the study integrates (a) automated indices from TAASSC to quantify usage-based patterns; (b) a TOEFL-aligned correlational component computing Pearson's r and R^2 (= r^2) to estimate the predictive power of specific indices for proficiency testing; and (c) manual register profiling via LGSWE, restricted to syntactic features. Finally, a triangulation step integrates quantitative indicators with qualitative register diagnostics to yield a context-sensitive account of developmental trends, proficiency alignment, and register-appropriate control in learner writing.

CHAPTER FOUR

Findings

Chapter Four

Findings

This chapter is organized around three primary categories. It presents the results of the quantitative and qualitative syntactic complexity analysis run in different approaches: SCMs, LGSWE model, and TOEFL Benchmarks.

4.1 Syntactic Complexity Measures

The students' texts show a steady increase in syntactic complexity across the three academic levels. Higher levels produced longer sentences, more elaborated noun phrases, and greater use of complex phrasal modification. The development in writing showed a gradual reduction in reliance on finite subordination. This section will describe the sample analyzed in the study. Table 2 below presents an insight into the academic levels, the number of texts, and the average number of tokens found in each level.

Table (2): Profile of Corpus Texts

Academic Levels	Number of Texts	The Average number of Words
Intermediate Level (IL)	40	271
Upper-Intermediate Level (UIL)	40	354
Advanced Level (AL)	40	369

The corpus utilized in this study comprised a total of 120 written texts evenly collected from three academic levels: Intermediate Level (IL), Upper-Intermediate Level (UIL), and Advanced Level (AL). Each level included 40 texts. The average of the word count varied across levels, with IL texts averaging 271 tokens, UIL texts averaging 354 tokens, and AL texts averaging 369 tokens, meeting the highest expectations of word

count. This gradual variation in percentages entails a possible development in language competence throughout the years as students gradually meet the language competency norms.

4.1.1 Syntactic Complexity Analysis

This section includes the usage-based syntactic complexity measures found in each academic level analyzed by the tool for the Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC). The level of writing proficiency largely stems from students' competence and awareness of the different syntactic measures shown in Table 3 below. The table presents the mean scores of five key syntactic indices, Mean Sentence Length (MLS), Mean Clause Length (MLC), Clauses per T-unit (C/T), Noun Phrase Modifiers per NP, and Determiner Accuracy, across the three levels examined in the study.

Table (3): Key Syntactic Indices Across Academic Levels

Level	Mean Sentence Length (MLS)	Mean Clause Length (MLC)	Clauses per T-unit (C/T)	Noun Phrase Modifiers (per NP)	Determiner Accuracy (score)
IL	13	9	1.70	0.35	1.6
UIL	17	12	1.75	0.50	3.5
AL	21.4	13.4	1.68	0.67	9.1

The results reveal a clear upward trend in both structural complexity and grammatical accuracy as proficiency increases. The average sentence length increased from 13 words at the IL to 17 words at the UIL and reached 21.4 words at the AL. A similar trend is observed in clause length, with the MLC rising from 9 words at IL to 12 at UIL and 13.4 at AL. Although the number of clauses per T-unit (C/T) showed only minor fluctuations, 1.70 at IL, 1.75 at UIL, and 1.68 at AL, this relative stability

implies that higher-proficiency learners may employ more sophisticated sentence structures without necessarily increasing clause density. In terms of nominal complexity, the frequency of noun phrase modifiers increased from 0.35 per NP at IL to 0.50 at UIL and 0.67 at AL, indicating a greater capacity for noun phrase elaboration among advanced learners.

Determiner accuracy improved markedly across the three writing levels analyzed in this study. It rose from 1.6 at the Intermediate level (IL) to 3.5 at the Upper-Intermediate level (UIL) and peaked at 9.1 at the Advanced level (AL). These gains reflect a significant improvement in functional grammatical control in the use of determiners. This developmental pattern aligns with Lu and Ai (2015). Their study on *Syntactic complexity in college-level English writing: Differences among writers with diverse L1 backgrounds* noted that articles and determiners are typically acquired later due to their semantic and syntactic complexity.

4.1.1.1 **Intercorrelation Test**

An analysis of intercorrelations among the five most frequent usage-based syntactic indices derived from learners' writing is displayed below in Table 4. It includes noun phrase elaboration, determiner usage, verb–argument construction frequency (VAC frequency), association strength, and lexical diversity and frequency.

Table (4): Intercorrelations Among Usage-Based Indices

Variable	1	2	3	4	5
1. Np_elaboration	1.00	.65**	.45*	.25	.38*
2. Determiners	.65**	1.00	.72**	-.15	.28
3. Vac_frequency	.45*	.72**	1.00	.18	.35*
4. Association_strength	.25	.15	.18	1.00	.12
5. Diversity_and_frequency	.38*	.28	-.35*	.12	1.00

Note. N = 40. *p < .05. **p < .01.

The analysis shows a strong positive correlation between noun phrase elaboration and determiner usage ($r = .65$, $p < .01$), showing that learners who produce more complex noun phrases also tend to use determiners with greater accuracy or frequency. Similarly, determiner usage is highly correlated with VAC frequency ($r = .72$, $p < .01$), indicating a link between syntactic control in noun phrases and mastery over verb–argument constructions.

Moderate correlations were found between noun phrase elaboration and both VAC frequency ($r = .45$, $p < .05$) and lexical diversity and frequency ($r = .38$, $p < .05$), highlighting the role of elaborated noun structures in overall syntactic and lexical sophistication. Interestingly, VAC frequency correlated negatively with diversity and frequency ($r = –.35$, $p < .05$), which may point to a trade-off between reliance on familiar syntactic frames and lexical variety. In contrast, association strength did not significantly correlate with other indices, suggesting it operates independently within the construct of syntactic sophistication.

While some usage-based indices (e.g., determiners, VAC frequency, and NP elaboration) cluster together and reflect cohesive syntactic growth,

others, such as association strength, may represent more discrete or nuanced developmental aspects. These findings support a multifactorial view of syntactic maturity in L2 writing, where grammatical accuracy, lexical diversity, and constructional frequency interact in complex ways.

The intercorrelations presented in Table 4 can be meaningfully interpreted through the lens of actual learner writing. For instance, the strong correlation between noun phrase elaboration and determiner usage ($r = .65$, $p < .01$) is reflected in the Advanced Level (AL) essay, where phrases such as “the combination of economic strain, potential security threats, and sociocultural disruptions” demonstrate both dense nominal modification and accurate article use. Similarly, the significant link between determiner usage and verb–argument construction frequency ($r = .72$, $p < .01$) aligns with the AL writer's command of complex syntactic dependencies, as seen in “employers are responsible for covering a range of additional expenses,” where both verbal structures and determiners are skillfully managed. At the Upper-Intermediate Level (UIL), the moderate correlation between noun phrase elaboration and lexical diversity ($r = .38$, $p < .05$) is evident in phrases like “the easiest and most comfortable way to let time pass,” which show expanding modifier use and varied lexis.

On the other hand, the negative correlation between VAC frequency and diversity ($r = –.35$, $p < .05$) may explain the Intermediate Level (IL) student's reliance on repetitive structures and limited lexical range, as seen in “drinking too many soft drinks... keep reminding yourself... quitting your addiction,” where frequent verbal frames substitute for more nuanced expression. The relatively weak correlations involving association strength (e.g., $r = .25$ with NP elaboration) further support its independence as a dimension, perhaps explaining why even some AL-level sentences such as “These incidents pose serious threats to the safety of household members”

are structurally sound but semantically conventional. Thus, these textual examples illustrate how quantitative patterns in usage-based indices manifest across learners' actual syntactic choices, validating both the statistical relationships and their developmental implications.

4.1.1.2 TOEFL Correlation Test

The relationship between indices such as mean sentence length, noun phrase elaboration, and determiner accuracy is examined to determine their influence on overall writing performance. Table 5 below identifies which syntactic features are most strongly associated with higher proficiency as reflected in standardized scoring rubrics, thereby informing both theoretical models of L2 development and practical approaches to writing assessment.

Table (5): Correlation Between Syntactic Indices and TOEFL Descriptors

Indices	**Correlation with TOEFL (r)**	**R^2**
Mean Sentence length	0.71	0.50
Noun Phrase Elaboration	0.54	0.29
Determiner Accuracy	0.48	0.23

As seen in Table 5 above, the correlation coefficients explain the variance (R^2) between selected syntactic complexity indices and TOEFL writing proficiency descriptors. It offers insight into the predictive strength of these measures in L2 assessment contexts. The findings indicate that Mean Sentence Length (MLS) exhibits the strongest positive correlation with holistic scores (r = 0.71), explaining 50% of the variance in writing performance. This suggests that learners who produce longer, more complex sentences are more likely to receive higher scores, reflecting raters' emphasis on structural maturity in academic writing. Noun Phrase Elaboration also shows a moderate correlation (r = 0.54), accounting for

29% of the variance, highlighting the contribution of nominal density and modifier use to perceived writing quality.

Finally, Determiner Accuracy yields a lower yet meaningful correlation (r = 0.48) and explains 23% of the variance, indicating that functional grammatical precision, while important, plays a somewhat smaller role in overall score prediction. These results are consistent with existing TOEFL rubrics and empirical research that prioritize syntactic variety and elaboration as indicators of advanced proficiency. The pattern underscores the value of syntactic sophistication, particularly at the sentence and noun phrase levels, as a reliable predictor of holistic writing achievement in high-stakes L2 contexts.

4.1.2 Register-Based Syntactic Features

A syntactic profile based on the LGSWE model enables comparison between the linguistic characteristics of academic and conversational discourse across academic levels. When viewed through this lens, the syntactic indices are interpreted as developmental shifts. The development emerges from clause-dominated constructions, typically demonstrating conversational language style characterizing lower levels of writing proficiency. It rises towards more phrasally dense academic features, characteristic of more advanced writing proficiency (see Appendix C).

4.1.2.1 Syntactic Features Profiling

Table 6 presents a comparative framework aligning register-based features with observed syntactic patterns across the three academic levels. The table delineates how clausal complexity, phrasal density, and syntactic functions evolve in learner writing as it gradually approximates academic discourse norms. The levels are described according to four dimensions:

register patterns, clausal complexity, phrasal density, and syntactic functions.

Table (6): Register-Based Features Found At Different Academic Levels

Register-Based Features	IL Register-Based Features	UIL Register-Based Features	AL Register-Based Features
Register Patterns	Conversational patterns	Transitional patterns	Academic patterns
Clausal Complexity	Basic subordination	Moderate coordination	Advanced embedding
Phrasal Density	Limited modifiers	Emerging complexity	Dense elaboration
Syntactic Functions	Fragment structures	Transitional forms	Academic features

At the Intermediate Level (IL), students' writing reflects the conversational register, with syntactic features such as basic subordination, limited modifiers, and fragment structures.

4.1.2.1.1 Basic Subordination

IL students frequently use single, straightforward dependent clauses to link ideas. These clauses often rely on common subordinators such as because or although without additional layering. These examples confirm the presence of subordination, though in its most elementary form. Illustrative examples from the data are listed below.

Example 1. "First, you should find a healthier option to drink, even if the taste is different."

Example 2. "Individuals often experience adverse health effects as a result."

Example 3. “People who place their daily base of water with any kind of soft drink, although they know soft drinks harm their bodies.”

4.1.2.1.2 Limited Modifiers

IL students’ noun phrases reveal minimal elaboration, usually restricted to single adjectives or quantifiers. Here, the modifiers (*high, significant, main*) remain isolated, showing limited modification and confirming the low phrasal density noted for IL writing.

Example 4. “Soft drinks contain a high amount of sugar and caffeine.”

Example 5. “Soft drinks pose significant health risks.”

Example 6. “Soft drinks are the main thing people like to drink.”

4.1.2.1.3 Fragment Structures

IL texts also reveal incomplete or fragmentary structures, a feature typical of spoken discourse. These structures demonstrate reliance on conversational forms rather than fully developed written syntax.

Example 7. “So what are the ways to deal with the addiction?”

Example 8. “Bigger contributes to increasing calorie...”

Example 9. “For example, going to work and you’re thirsty, the first thing that comes to mind is to drink something cold...”

In contrast, the UIL students’ writing reflects a transitional stage between conversational and academic registers. Syntactic features such as moderate coordination, emerging complexity, and transitional forms are emerging.

4.1.2.1.4 Moderate Coordination

UIL students frequently employ coordination, primarily through conjunctions such as *and* and *but*, to link multiple clauses within a sentence. Unlike IL writing, where coordination is shorter and simpler, UIL students extend their sentences into longer coordinated chains. While these remain somewhat repetitive, they reflect a step toward greater syntactic cohesion. Illustrative examples from the data are listed below.

Example 10. "It became one of the most popular apps, and it gives people a chance to show their talent."

Example 11. "TikTok is fun and people use it every day."

Example 12. "It is entertaining, but it can also be harmful."

4.1.2.1.5 Emerging Complexity

UIL texts demonstrate early signs of syntactic complexity through the use of subordinate clauses, causal connections, and expanded noun phrases. These forms are not yet fully controlled but indicate a shift away from basic conversational structures toward more layered syntax typical of academic registers. The reliance on subordinators such as because, although, and when reflects this developmental movement.

Example 13. "Although TikTok is used for entertainment, many students spend more time on it than studying."

Example 14. "The application is designed to attract users by recommending videos that are similar to what they liked before."

Example 15. "Because it is easy to use, everyone can make videos and share them quickly."

4.1.2.1.6 Transitional Forms

The UIL level is also marked by hybrid or transitional structures where conversational tendencies, such as run-on coordination, coexist with emerging academic strategies like causal markers and topical noun phrases. These transitional forms highlight the developmental nature of UIL writing as students attempt to merge spoken-style fluency with academic-like elaboration.

Example 16. “TikTok is popular, and you can waste a lot of time on it because it is addictive.”

Example 17. “Many people like to use it, and it is better than other apps; it is considered famous.”

Example 18. “TikTok is good for learning, but sometimes you don’t know if the information is right or not.”

At the Advanced Level (AL), students’ writing reflects the academic register, with syntactic features such as advanced embedding, dense elaboration, and academic functions. These features illustrate a significant departure from conversational simplicity and transitional coordination, marking a shift toward the complexity and informational density characteristic of academic discourse.

4.1.2.1.7 Advanced Embedding

AL students frequently embed multiple dependent clauses within single sentences, creating complex hierarchical structures. This embedding often layers causal, concessive, and relative clauses, producing the dense argumentation typical of academic texts.

Example 19. “Although governments have raised awareness of the dangers of soft drinks, many individuals continue to consume them because advertisements emphasize pleasure and energy, which distracts from the harmful effects.”

Example 20. “People often justify their consumption by claiming that soft drinks help them to stay awake, even though such justification ignores the long-term risks that these beverages pose to their health.”

Example 21. “If schools restrict the availability of sugary drinks, students will be encouraged to choose healthier alternatives, which can improve their physical well-being in the long run.”

4.1.2.1.8 Dense Elaboration

AL students’ noun phrases reveal extensive modification, often layering prepositional phrases, relative clauses, and multiple adjectives. This elaboration significantly increases phrasal density, signaling a shift from spoken-like modification toward dense academic description.

Example 22. “The harmful impact of excessive soft drink consumption on both the physical and psychological health of young people is undeniable.”

Example 23. “The continuous marketing strategies of international beverage corporations targeting adolescents create a culture of dependency.”

Example 24. “The long-term consequences of high sugar intake, including obesity, diabetes, and cardiovascular problems, are well documented.”

4.1.2.1.9 Academic Functions

Finally, AL texts display syntactic functions that mark academic stance, including concessive forms, evaluative expressions, and explicit argumentative positioning. These elements allow students to articulate claims, weigh counterarguments, and adopt an authoritative voice.

Example 25. "While some argue that soft drinks provide energy, the evidence clearly demonstrates that their negative effects outweigh any temporary benefits."

Example 26. "It is essential that governments implement stricter policies to regulate the sale and advertisement of soft drinks."

Example 27. "Undoubtedly, reducing soft drink consumption should be a public health priority."

4.1.2.2 Syntactic Errors Profiling

The analysis revealed a clear difference in error types and syntactic complexity, where areas of syntactic difficulty shifted as learners showed fewer syntactic errors as they advanced from lower to higher writing levels. Table 7 categorizes the most frequent syntactic errors observed in learner writing across the three levels examined and provides representative examples drawn from the dataset.

Table (7): Prevalent Syntactic Errors Across Levels

Level	Most Frequent Errors
IL	Article misuse and verb-noun mismatch
UIL	Run-on sentences and pronoun ambiguity
AL	Over-embedding

At the Intermediate Level (IL), students' writing reflects persistent syntactic errors, most notably article misuse and verb–noun mismatch. These errors highlight the early developmental stage of learners' grammatical competence, where reliance on spoken-like structures and limited grammatical monitoring results in inaccurate forms.

4.1.2.2.1 Article Misuse

IL students frequently omit, overuse, or misuse definite and indefinite articles, particularly when referring to countable nouns or generalized categories. These errors reveal limited mastery of English article systems, which are often challenging for learners from non-article-based first languages. The following examples demonstrate inappropriate or missing articles:

Example 27. "Soft drinks contain a *high amount of sugar*."

Example 28. "People like to drink *cold drinks* in the morning."

Example 29. "The government should control the *advertisement of soft drinks*."

These instances confirm that article misuse is a systematic pattern at IL, consistent with research indicating that article acquisition is one of the most protracted processes in second language development.

4.1.2.2.2 Verb–Noun Mismatch

Another frequent error involves mismatches between subjects and verbs or inappropriate verb forms with plural or singular nouns. These errors illustrate underdeveloped morphosyntactic control and the influence

of spoken production patterns, where learners prioritize conveying meaning over grammatical accuracy. Examples include:

Example 30. “Soft drinks are harmful to people.”

Example 31. “Many students *like* to drink soda before an exam.”

Example 32. “Energy drinks *help* the body, and they *give* more power.”

At the Advanced Level (AL), students’ writing reflects a stronger command of the academic register, with frequent use of complex subordination, dense modification, and academic features (see Table 6). However, this greater sophistication often leads to the syntactic error of over-embedding. Unlike IL and UIL errors, which stem from insufficient development or lack of cohesion, AL errors occur because students attempt to construct sentences with multiple layers of subordination and modification, exceeding the limits of clarity and processing.

4.1.2.2.3 Over-embedding

AL students frequently produce sentences in which clauses are heavily embedded within each other, or where noun phrases are overloaded with modifiers. While this demonstrates advanced control over syntactic resources, it can obscure meaning and reduce readability. This aligns with the “advanced embedding” stage in Table 6, where embedding is present but sometimes overused. Illustrative examples from the data include:

Example 34. “Soft drinks, which are consumed daily by millions of people across different age groups and which have been consistently proven by numerous studies to contribute to obesity, diabetes, and other health issues, continue to be marketed aggressively.”

Example 35. “The government, in response to increasing public concern and following recommendations from health experts who argue that taxation is the most effective deterrent, should implement stricter policies.”

Example 36. “Individuals who, despite being aware of the long-term negative consequences and despite having access to healthier alternatives, persist in consuming large amounts of sugary drinks, illustrate the addictive nature of these beverages.”

These examples reveal how multiple relative clauses and layers of embedding complicate sentence structure. Though grammatically correct, the sentences become syntactically dense, often sacrificing clarity for elaboration.

4.1.2.3 Error Patterns Description

Figure 2 visually represents the register-based structural error patterns observed in L2 learners’ writing across the three academic levels according to the Longman Grammar of Spoken and Written English (LGSWE) framework. This developmental model is reflected in learners' syntactic choices and grammatical errors as they progress in proficiency. The figure illustrates how student writing transitions along this continuum with representative structural features and authentic examples from learner texts.

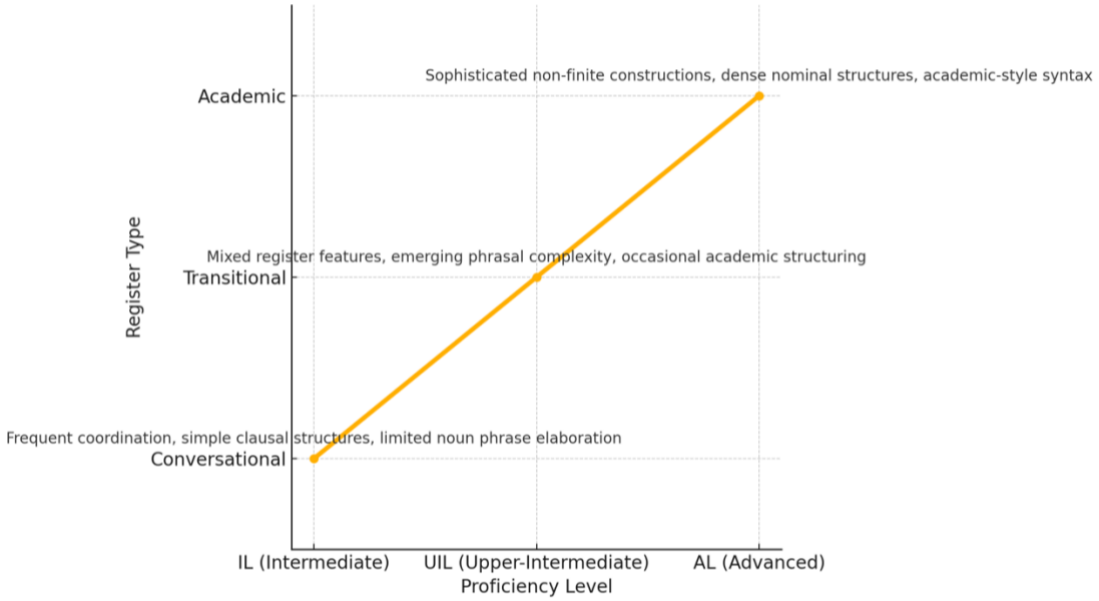


Figure (2): Error Patterns Across Writing Levels

At the IL, learner writing displays predominant features of the conversational register, characterized by a reliance on coordination, simple clausal constructions, and minimal noun phrase elaboration. The syntactic structures are generally linear, with limited subordination and frequent use of parataxis, reflecting patterns commonly associated with spoken discourse. For example, *"People these days have an addiction to junk food, mainly soft drinks. There are many different flavors, such as Coca-Cola and Pepsi…"*. This excerpt relies heavily on basic sentence structures and coordination without syntactic hierarchy, while noun phrases like *"soft drinks"* and *"different flavors"* are presented without elaboration. These features reflect an early stage of L2 writing development in which lexical variety and syntactic control are still emerging.

The UIL represents a transitional phase in which learners begin to shift from speech-like syntax toward more formal written constructions. This phase is characterized by emerging complexity in clause structure, increased use of embedding, and a more deliberate attempt to organize information hierarchically. For example, a student at this level wrote:

"Most people who create content use TikTok to share their personal vlogs, jokes, or even recommendations". The use of the relative clause *"who create content"* and the elaborated noun phrase *"vlogs, jokes, or even recommendations"* reflects a developing ability to construct more complex sentences and convey layered meaning. Such structures signal learners' growing awareness of academic conventions, though inconsistencies in cohesion and register control may still be present.

Finally, learners' writing aligned with the academic register at the AL. It characterized increased syntactic density, precise nominal constructions, and abstract lexico-grammatical structures. Errors at this stage probably stem from attempts to manage complexity rather than from limitations in basic grammar. An example for that would be a sentence like: *"Rather than imposing a blanket ban, a more pragmatic and humane approach would involve improved regulation, oversight, and ethical employment practices"*. The student here utilized adverbial subordination, nominalization, and multi-layered coordination, which are key features of academic discourse. Another excerpt from the same student reads: *"The statement 'Housemaids should be banned in Bahrain' has gained attention in public discourse, prompting strong opinions on both sides."* Here, the embedded quotation, use of abstract nominal subjects, and participial phrase *"prompting strong opinions"* all illustrate the structural complexity and rhetorical control expected in academic writing. These features are indicative of learners' advanced proficiency and mastery of discourse-level syntax.

The progression underscores the interdependence of grammatical development and discourse context in L2 writing. As learners advance in proficiency, their writing reflects a marked shift from structurally simple,

speech-like patterns to complex, information-rich forms characteristic of academic genres.

4.2 Summary

This chapter reports findings from three perspectives: usage-based syntactic complexity, register profiling, and alignment testing with TOEFL descriptors across the three academic levels. Usage-based indices showed clear development, with the Mean Sentence Length and Mean Clause Length rising, while Clauses per T-unit remaining comparatively stable, indicating more sophisticated structuring. Register analysis mapped a shift from conversational patterns characterized by fundamental subordination and limited modifiers to academic patterns featuring dense nominal elaboration and advanced embedding. Intercorrelation results substantiate a coherent developmental cluster, featuring NP elaboration that correlates strongly with determiner usage and both of which relate to verb–argument construction frequency. Finally, TOEFL analyses identified Mean Sentence Length as the strongest single predictor of proficiency, followed by NP elaboration and determiner accuracy, which reinforces the notion that phrasal density and structural maturity differentiate advanced academic writing.

Chapter Five

Discussion

Chapter Five

Discussion

This chapter discusses the findings around the three investigated themes in the research questions.

5.1 Syntactic Complexity Indices by Academic Levels

The syntactic complexity measures analyzed in this study provide critical insight into the developmental patterns of L2 academic writing across the three levels. This study captured the breadth and depth of syntactic development by quantifying structural sophistication through the usage-based indices. The metrics found not only align with well-established dimensions of second language acquisition (SLA) but also illustrate how learners incrementally acquire the grammatical and rhetorical tools associated with more sophisticated writing. The following discussion interprets these measures in relation to the broader literature and evaluates their developmental significance.

A transition from additive to integrative complexity becomes apparent as learners progress in their writing development. Beginning writers showed more dependency on coordination and linear clause chaining to express ideas, while more advanced learners moved toward embedding information within noun phrases and subordinate structures. This shift supports the argument by Biber, Gray, and Poonpon (2011) that academic writing prioritizes nominal complexity and syntactic hierarchy over clausal expansion. Instead of simply producing longer texts, more advanced learners appeared to deploy more linguistically efficient strategies, relying on dense and referentially loaded structures that reflect awareness of academic register. This progression is evident across all

levels of writing examined in the study and provides a compelling illustration of syntactic sophistication beyond surface fluency. One clear indicator of such development is the consistent increase in structural and functional measures across levels, as summarized in Table 3. The rising values in sentence and clause length, as well as determiner accuracy and noun phrase elaboration, suggest that advanced learners not only possess greater syntactic range but also demonstrate improved control over precision-driven grammatical features. These results support the claim that syntactic complexity metrics are reliable predictors of writing development and reinforce the position that determiners are acquired later in L2 development due to their linguistic and processing demands, as demonstrated in recent research by Zhang et al. (2022). This contrasts with Nang Kham Thi and Nikolov's (2023) findings in their 13-week study on the effect of teacher automated and combined feedback on EFL students' writing. No significant improvement was observed by the authors in syntactic complexity indices, including clause length and complex noun phrases, despite structured intervention. Their findings suggested that syntactic development may not follow a uniform trajectory and could require more targeted exposure and instruction.

While some metrics remain stable, this does not imply stagnation; rather, it suggests that learners are refining the quality and depth of their syntactic decisions instead of expanding them. These findings affirm that L2 syntactic development is neither strictly linear nor uniform across grammatical domains. It involves gradual, recursive advances in structural complexity, grammatical accuracy, and discourse alignment. By integrating both quantitative and visual syntactic indicators, this study provides robust support for Biber et al.'s (1999) contention that grammatical choices are functionally motivated and shaped by

communicative context. The learners' increasing syntactic maturity reflects not only internal linguistic growth but also a developing ability to meet the rhetorical expectations of academic genres.

The analysis of usage-based syntactic complexity confirms that L2 writing development is a multifaceted process. As learners move from intermediate to advanced levels, their writing becomes increasingly characterized by phrasal density, syntactic integration, and grammatical precision, which are hallmarks of academic discourse. These findings substantiate theoretical claims about the role of register in shaping grammar and offer practical implications for pedagogy. It necessitates that instruction emphasize not only accuracy or fluency, but also the rhetorical and structural strategies that define advanced writing. The use of fine-grained syntactic indices thus offers a powerful diagnostic and developmental tool for advancing L2 academic literacy.

5.2 Writing Proficiency Features According to the LGSWE Model

The register-based features of syntactic complexity patterns observed across the different levels in this study offer further evidence for the developmental trajectory from conversational to academic discourse in L2 writing. The Longman Grammar of Spoken and Written English (LGSWE) model contrasts clausal complexity in conversation with phrasal density in academic writing. Drawing on this, the study interprets learners' grammatical choices not only as markers of syntactic maturity but also as indicators of genre awareness. As learners progress from intermediate to advanced proficiency, their syntactic constructions increasingly reflect the functional demands and structural expectations of academic discourse. The data, therefore, illuminate how register-sensitive development unfolds

across clausal and phrasal dimensions. It also offers insight into how L2 writers acquire the structural resources necessary for effective academic communication.

One notable developmental trend across levels of writing is the shift from clause-dominated constructions to more densely elaborated noun phrases. This transformation supports Biber and Gray's (2016) contention that while conversation favors finite clause chaining, academic writing relies on embedding and nominal modification to condense information. Early-stage L2 writing often reflects reliance on coordination and verbal complements, as learners prioritize fluency over structural depth. In contrast, advanced learners show greater control over non-finite clauses, noun complement structures, and hierarchical modification, indicating syntactic strategies that align with the rhetorical needs of academic discourse. Table 6 illustrates this shift by mapping clausal complexity, phrasal density, and syntactic function across LGSWE register features and observed learner patterns.

The movement from basic subordination and fragmentary noun phrases at the intermediate level to advanced embedding and dense nominal structures at the advanced level reflects increasing register alignment. These findings affirm the claim that L2 syntactic development is register-dependent and genre-sensitive (Biber et al., 1999). Furthermore, the emergence of noun complements and prepositional postmodifiers in upper-level writing suggests that learners begin to internalize the informational load and syntactic abstraction characteristic of academic genres (Biber & Gray, 2010). The correspondence between observed learner patterns and LGSWE descriptors strengthens the argument that syntactic complexity should be analyzed through the lens of register-specific norms, not merely structural accumulation.

The progression in noun phrase elaboration reveals clear developmental contrasts among proficiency groups, as shown in Figure 2. The IL group's restricted range corresponds to minimal internal modification, while the AL group demonstrates broader elaboration, consistent with academic discourse expectations. These visual trends reinforce the argument that noun phrase complexity is a key site of grammatical and register development. As Ortega (2003) and Lu (2011) have noted, noun phrase elaboration, especially through modifiers and prepositional phrases, is a sensitive measure of syntactic advancement in writing, and the present results offer strong empirical support for that position. The growth in this area likely reflects not only grammatical learning but also increased exposure to and modeling of academic language.

The findings of this study contribute to a growing body of research that conceptualizes L2 writing development as a shift from conversational to academic register use. By analyzing syntactic patterns through the lens of the LGSWE model, it becomes evident that learners' grammatical choices are increasingly shaped by genre expectations and rhetorical function. The development of noun phrase elaboration, non-finite embedding, and academic syntactic functions illustrates a multidimensional trajectory grounded in both structural knowledge and discourse awareness. The limited elaboration found at the intermediate level, the mixed strategies at the transitional stage, and the academic precision achieved at the advanced level affirm Biber et al.'s (1999) and Biber and Gray's (2016) assertions that grammatical complexity is both functionally motivated and register-dependent. These findings support the pedagogical value of teaching grammar in relation to academic discourse features, which enables learners not only to improve accuracy but also to

expand their ability to express complex ideas in appropriate academic forms.

5.2.1 Syntactic Complexity Indices Correlations with TOEFL Proficiency Descriptors

This section examines the extent to which specific syntactic measures predict overall writing quality as assessed through holistic scoring. By investigating the correlation between syntactic indices and standardized writing performance, the analysis aims to identify which structural and grammatical features are most indicative of advanced proficiency in L2 writing. In particular, the focus is placed on three usage-based indices: mean sentence length, noun phrase elaboration, and determiner accuracy. These indices have been widely recognized in previous literature as potential indicators of syntactic maturity.

The results presented in Table 5 provide important insights into the predictive validity of syntactic complexity measures in relation to holistic writing scores in L2 assessment. Among the three indices analyzed, Mean Sentence Length (MLS), Noun Phrase Elaboration, and Determiner Accuracy, MLS showed as the most robust predictor of writing quality. This strong association suggests that raters may interpret longer and more structurally complex sentences as indicative of higher language proficiency and academic readiness. Such a pattern aligns with Lu (2011) and Biber, Gray, and Poonpon (2011), who emphasized sentence-level elaboration as a distinguishing feature of advanced L2 writing. In learner texts, this is evident at the Advanced Level (AL), where syntactic length and layering are employed to convey abstract reasoning and argumentative depth, as in the sentence, "*Beyond the financial considerations, security concerns have emerged as a growing area of apprehension.*"

Noun Phrase Elaboration also demonstrated a moderately strong predictive relationship with holistic writing scores. It underscores the importance of phrasal density in academic discourse. Elaborated noun phrases consisting of premodifiers, postmodifiers, and embedded elements are not only structurally complex but also signal higher lexical precision and informational load. Both are considered highly valued in writing assessment rubrics according to the Educational Testing Service (2021). At the AL, noun phrase constructions such as "*the combination of economic strain, potential security threats, and sociocultural disruptions*" reflect a high level of syntactic maturity and discourse awareness. This supports the view from Biber and Gray (2016) that advanced writers achieve complexity not solely through coordination or subordination but through compact and information-rich phrasal packaging.

Determiner Accuracy yielded the lowest correlation of all. However, it still accounts for a meaningful portion of the variance in writing scores. Functional accuracy in article usage and determiner selection, particularly with complex noun phrases, is a persistent challenge for L2 learners and often develops later in the acquisition process. Nonetheless, the presence of determiners in syntactically appropriate contexts contributes to the perception of grammatical control and coherence. For instance, the accurate use of articles in the phrase "*the safety of household members*" contributes to the fluency and precision expected at higher levels of competency.

These findings highlight that syntactic complexity at the sentence and noun phrase levels is a reliable predictor of holistic writing performance in high-stakes assessment contexts. While determiner accuracy is less predictive than structural measures, its role in marking grammatical maturity remains significant. These results reinforce the

multidimensional nature of syntactic development in L2 writing and emphasize the importance of integrating both structural and functional indices in writing evaluation frameworks. Moreover, they suggest that instructional efforts aiming to improve L2 writing proficiency should focus not only on clause-level coordination and subordination but also on the development of syntactic density through noun phrase elaboration and consistent functional accuracy.

5.2.2 Intercorrelations of the Indices

This section discusses the developmental patterns and interrelationships among usage-based syntactic indices across varying levels of language proficiency. By examining the statistical correlations between syntactic features such as noun phrase elaboration, determiner usage, verb–argument construction frequency, association strength, and lexical diversity, the analysis aims to illuminate how syntactic complexity unfolds throughout L2 development.

The intercorrelation analysis of usage-based syntactic indices, as presented in Table 4, offers compelling insights into how various dimensions of syntactic sophistication interact and manifest across different writing stages. The patterns suggest that syntactic development in L2 writing is neither linear nor uniform but instead reflects a dynamic interplay between grammatical control, structural elaboration, and lexical precision.

At the Intermediate Level (IL)**,** learners' writing reflects limited syntactic development and lexical variety. The relatively low levels of noun phrase elaboration and determiner accuracy, paired with a negative correlation between VAC frequency and lexical diversity ($r = –.35$, $p <$

.05), indicate an overreliance on repetitive verbal constructions and formulaic structures. This is evident in the IL essay, where expressions such as "*drinking too many soft drinks... keep reminding yourself... quitting your addiction*" illustrate a dependency on familiar verbal frames with minimal nominal modification or lexical expansion. The weak performance on determiner usage further supports previous findings that functional elements are acquired later in L2 development (Hawkins & Chan, 1997). The absence of significant correlations involving association strength also suggests that IL learners may be focused on surface-level fluency rather than deeper syntactic-semantic integration.

Progressing to the Upper-Intermediate Level (UIL)**,** there is a noticeable improvement in the interaction between noun phrase complexity and lexical sophistication. The moderate positive correlation between NP elaboration and lexical diversity ($r = .38$, $p < .05$) illustrates that learners at this stage begin to integrate more varied vocabulary with structural development. This is evident in expressions such as "*the easiest and most comfortable way to let time pass*," which show emerging modifier use and greater lexical nuance. The positive correlation between NP elaboration and VAC frequency ($r = .45$, $p < .05$) further implies growing syntactic maturity, as learners manage more complex clause structures. However, determiner usage still varies inconsistently, reflecting transitional competence and developmental variability typical of this stage.

At the Advanced Level (AL)**,** syntactic features converge more robustly, with strong correlations between noun phrase elaboration and determiner usage ($r = .65$, $p < .01$), and between determiner usage and VAC frequency ($r = .72$, $p < .01$). These results suggest that advanced learners can coordinate fine-grained grammatical accuracy with structurally complex constructions. Sentences such as "*the combination of economic*

strain, potential security threats, and sociocultural disruptions" reflect dense nominal phrasing and accurate article use, while structures like "*employers are responsible for covering a range of additional expenses*" demonstrate sophisticated command of verb–argument dependencies and functional markers.

These patterns align with Biber and Gray's (2016) characterization of academic writing as structurally dense and phrasally elaborated. Notably, association strength remains statistically unlinked to other indices, even at this level, suggesting it may represent a qualitatively different aspect of syntactic sophistication, perhaps related more to semantic cohesion or rhetorical control than grammatical complexity per se.

These findings support a developmentally sensitive model of syntactic sophistication in L2 writing. At lower levels, learners rely heavily on familiar verbal constructions with limited noun phrase complexity and lexical range. As proficiency increases, so does the ability to manage modifier-rich structures, greater functional accuracy, and lexical diversity. By the advanced stage, these features become increasingly integrated, reflecting control over the register-specific demands of academic writing. However, the independence of certain indices, such as association strength, suggests that not all features mature concurrently, reinforcing the need for multifactorial approaches to assessing syntactic growth.

The current findings and Kyle (2016) present converging evidence on the developmental nature of syntactic complexity in L2 writing. In the current study, syntactic indices such as Mean Sentence Length (MLS), Mean Clause Length (MLC), and Clauses per T-unit (C/T) increased progressively from the Intermediate (IL) to Advanced (AL) level, with AL

learners reaching an MLS of 21.4 words and demonstrating higher noun phrase density (0.67 modifiers per NP). This pattern supports a shift from clausal simplicity to phrasal elaboration, aligned with academic discourse norms and the LGSWE model (Biber & Gray, 2016). Similarly, Kyle (2016, Section 6.2.1) found that syntactic complexity analyzer (SCA) indices were positively correlated with holistic writing scores and reflected longitudinal development: as learners gained experience, their use of complex nominals and dependent clauses increased significantly. Kyle's longitudinal data showed that syntactic growth parallels time spent in English learning environments, particularly in measures such as complex nominals per clause and verb phrase sophistication. Both studies affirm that syntactic complexity indices, especially noun phrase elaboration and sentence length, are reliable predictors of writing proficiency, and that advanced L2 writing is characterized by increased syntactic sophistication that evolves through sustained language exposure and instruction.

This section answered the second research question, addressing how different indices reflect different TOEFL proficiency levels, examining their correlations. The analysis proved some correlations as correct indicators of the proficiency levels, highlighting the most notable indices found in each level and their relations to other indices within the same level. The next section will examine the third research question, pointing out the least correlated indices that indicate students' prevalent syntactic errors.

5.3 Prevalent Syntactic Errors

The analysis of syntactic errors across academic levels revealed a clear developmental trajectory in both error typology and syntactic sophistication as learners shifted from Intermediate (IL) to Advanced Level (AL). It showed a clear alignment with well-established models of second

language acquisition. The syntactic errors became less frequent and less fundamental, as shown in Table 7, shifting from mechanical inaccuracies (e.g., article misuse, verb-noun mismatches) to more nuanced issues related to cohesion and stylistic complexity (e.g., over-embedding, pronoun ambiguity). These findings are consistent with the interlanguage framework (Selinker, 1972), which suggests that learner language evolves progressively toward the target norm while exhibiting systematic and transitional features along the continuum of proficiency.

The prevalence of article misuse and verb-noun mismatches corresponds with research emphasizing the persistent difficulty L2 learners face with functional grammar at the Intermediate Level. Ionin, Ko, and Wexler (2008) found that article misuse in L2 English stems from the complex interplay between form, semantics, and discourse context. Learners at this level commonly produced structures such as "*do research*" instead of the more native-like "*conduct research*," or omitted necessary determiners ("*a friend*") in otherwise simple constructions. These errors reflect limited exposure to collocational norms and incomplete acquisition of determiner systems, as also discussed in Biber, Johansson, Leech, Conrad, and Finegan (1999), who noted that functional words are among the last to stabilize in learner grammars.

The dominant errors shifted towards run-on sentences and pronoun ambiguity at the next level of writing (UIL)**,** which showed the learner's attempt to incorporate more complex sentence structures without yet mastering cohesion. This observation aligns with Hyland (2003), who came up with the theory that transitional L2 writers often struggle with maintaining referential clarity and clause integration. Sentences such as "*It is important, and we need to…*" or "*They say this is not fair, it affects everyone*" demonstrate a lack of syntactic subordination and cohesion

markers, resulting in coordination overload or vague pronoun reference. These patterns suggest that while learners are making progress in syntactic range, their control over sentence-level organization and textual coherence remains unstable. Interestingly, this finding contrasts with the claims of Ferris and Roberts (2001), who suggested that once learners reach an intermediate level of proficiency, mechanical errors tend to dominate. In contrast, the results have shown that structural and referential errors persist at the UIL stage, which supports the argument that grammatical and discourse-level development do not always proceed in a tandem manner.

The emergence of over-embedding and rare determiner errors marks a qualitative shift in error type. Learners at the Advanced level showed a capability to produce structurally rich sentences, such as "*The rapidly growing…, which…*". However, they sacrificed the clarity of meaning due to syntactic over-complexity at some point. Biber and Gray (2016) identified this tendency in advanced academic prose, where phrasal density often leads to reduced readability despite grammatical correctness. The findings of this study echoed this observation, suggesting that syntactic advancement may introduce new challenges in managing cognitive load and reader accessibility. Minor determiner errors at this stage were rare but noteworthy, indicating that even advanced learners occasionally struggle with functional precision. This may be due to processing demands in dense constructions.

The findings support the developmental view that syntactic complexity and accuracy increase with proficiency. However, it illustrates that higher complexity may result in a different class of errors. This reinforces the argument made by Wolfe-Quintero (1998) that syntactic growth is accompanied by a shift in error types, not merely an increase in frequency. While beginner and intermediate learners display foundational

grammatical gaps, advanced learners demonstrate the trade-offs between elaboration and clarity, a phenomenon similarly observed in Kyle and Crossley's (2016) work on writing development. The progression from basic grammatical errors to stylistic and cohesion-related challenges as learners transition from IL to AL aligns with the broader literature on L2 writing development. It highlights the need for instruction that evolves with learner proficiency, shifting from a focus on form-based grammar at lower levels to a focus on cohesion, conciseness, and rhetorical control at more advanced stages.

5.3.1 Detected Error Patterns based on the LGSWE Model Register Features

The observed structural error patterns across academic levels provide empirical support for the Longman Grammar of Spoken and Written English (LGSWE) framework. It posits systematic variation in syntactic constructions aligned with different registers. Learner writing exhibited distinct grammatical tendencies at each proficiency level, reflecting their positioning along the continuum from conversational to academic discourse. Patterns of structural errors further confirmed register-based distinctions across academic levels as illustrated in Figure 2.

Student writing at the Intermediate level exhibited syntactic tendencies closely associated with the conversational register. These included a high reliance on coordination over subordination, limited clausal embedding, and minimal noun phrase elaboration. Such features are commonly found in oral discourse, where immediacy and simplicity take precedence over hierarchical structuring. The simplicity of these constructions suggests that learners at this stage rely heavily on spoken language norms, likely transferring L1 oral strategies into their L2 writing.

These findings support earlier research by Biber et al. (1999), who emphasized that conversation tends to favor shorter, less elaborated clauses and frequent parataxis. They are further consistent with second language acquisition studies (e.g., Ortega, 2003; Rimmer, 2006), which identify a predominance of simple structures and syntactic repetition in the writing of novice learners.

There was a notable transition in register as students moved to higher levels. Students at the Upper-Intermediate level demonstrate emerging syntactic complexity, including the use of embedded clauses, non-finite verb forms, and elaborated noun phrases. These developments reflect a growing awareness of written discourse conventions and a shift away from oral discourse structures. While errors persist, they are increasingly the result of attempts to integrate academic features rather than limitations in basic grammar.

This stage can be understood as a transitional phase in which learners begin negotiating more sophisticated grammatical constructions while still exhibiting variable control. These patterns echo the findings of Wolfe-Quintero, Inagaki, and Kim (1998), who argue that syntactic complexity and subordination increase with proficiency, and that developmental progress can often be traced through learners' expanding use of embedded and phrasally dense structures. Furthermore, the variability observed in transitional writing supports the notion of interlanguage variation, a concept emphasized by Larsen-Freeman (2006), which posits that language development is non-linear and influenced by cognitive, contextual, and task-based factors.

At the advanced proficiency level, the influence of academic register became most salient. Learners at this stage exhibit control over

syntactically dense structures, including nominalizations, embedded clauses, and multi-layered coordination. Errors, when present, typically arise not from fundamental grammatical deficiencies but from attempts to manage the increased cognitive and linguistic demands of complex sentence construction.

These findings align with Biber et al.'s (1999) observation that academic writing privileges information-dense syntactic structures designed to convey abstract and impersonal meaning. The ability of advanced learners to engage in such constructions also reflects Cumming's (2001) distinction between formulation and reformulation in second language writing, where learners evolve from basic sentence construction to manipulating syntax for rhetorical precision. The presence of modal verbs, hedging, and abstract noun phrases in the advanced-level texts indicates a deeper engagement with academic discourse strategies.

The progression observed across the three academic levels also contributes to discussions of genre-based pedagogy and the role of register awareness in academic literacy development. Illustrating how grammatical errors are register-dependent rather than merely indicative of general linguistic deficiency challenges the deficit-oriented views of L2 learner writing. This supports functional approaches that view grammatical development as socially situated and purpose-driven. It corroborates Shah's (2024) research, which claims that learners move from low to high proficiency and their errors shift from fundamental morphosyntactic issues to challenges related to structural complexity and discourse organization.

The current study and Shah's (2024) findings demonstrate comparable developmental trends in L2 writing across different writing levels. Both studies revealed a shift from basic grammatical errors at lower

levels to structural complexity challenges at higher levels, supporting a developmental transition from conversational to academic registers, as outlined in the LGSWE model. Shah (2024) reported that low proficiency learners made 46.7% verb tense errors, 53.3% subject-verb agreement errors, and 60% article misuse errors, while high proficiency learners showed higher errors in verb tense (93.3%) and subject-verb agreement (73.3%).

The register-based distinctions in syntactic errors illustrate a gradual developmental trajectory. They emphasize the role of register awareness in L2 writing proficiency, supporting the LGSWE model's view that syntactic choices are functionally motivated and contextually embedded. The findings also suggest that as learners progress, they move from structurally simpler and speech-like constructions toward syntactically dense and information-rich patterns typical of written academic discourse.

5.4 Summary

This chapter synthesizes the study's results across its core themes—developmental trends in usage-based syntactic complexity by level, register-sensitive features (LGSWE), and links to standardized assessment—framing the findings as evidence of a shift from "additive" complexity (coordination and clause chaining) to "integrative" complexity marked by phrasal density, embedding, and greater functional precision in academic discourse. It argues that rising sentence/clause length, improved determiner control, and noun-phrase elaboration indicate genuine maturation, while also cautioning that traditional ratios (e.g., DC/T, CN/T) can under-represent growth or confound register/task effects, hence the need to interpret indices functionally rather than in isolation. Consistent with this functional view, MLS emerges as the strongest single predictor

of holistic scores, with NP elaboration being moderately predictive and determiner accuracy less so, yet still meaningful for signaling grammatical maturity—implicating phrasal packaging and structural integration as the most assessment-salient cues of proficiency. Intercorrelations reveal a developmental convergence at AL (tight coupling of NP elaboration with determiner use and VAC control), a transitional profile at UIL, and constrained, verb-frame-heavy patterns with limited lexical variety at IL. Error analyses track an aligned trajectory: IL shows functional/mechanical issues (articles, verb–noun mismatches), UIL reveals cohesion problems (run-ons, pronoun ambiguity) as writers push complexity, and AL exhibits over-embedding trade-offs despite otherwise mature grammar patterns that map cleanly onto LGSWE's conversational→academic register continuum. The chapter concludes with pedagogical implications: advance beyond clause-counting to teach register-appropriate phrasal density, determiner precision, cohesion, and rhetorical control, using multifactorial indices (and visuals) as diagnostic tools for staged L2 writing development.

Chapter Six

Conclusion

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6.1 Conclusion

This study examined the development of syntactic complexity in the academic writing of Bahraini EFL university students across three writing levels: Intermediate, Upper-Intermediate, and Advanced. Through a mixed-methods approach, combining quantitative syntactic indices extracted via TAASSC and qualitative manual error analysis, the study aimed to identify the syntactic features most indicative of writing competence according to TOEFL proficiency descriptors. Key findings demonstrated a consistent upward trajectory in mean sentence length, noun phrase elaboration, and determiner accuracy, alongside a developmental shift from clause-based to phrasally dense structures. The syntactic indices found in the levels of writing closely aided the LGSWE framework manual analysis of register features—Academic vs. Conversational. The register features found in each level showed a progression from conversational to academic discourse style in writing, where conversational is the lowest level of writing and Academic is the highest level, according to the model.

Furthermore, the correlation between syntactic indices and TOEFL-based holistic scores confirmed the predictive validity of sentence-level and nominal complexity in assessing writing quality. The study highlights that syntactic development is not solely about increasing structural complexity, but also involves enhancing register awareness and discourse control, which are critical for achieving academic writing proficiency. This study contributes important insights into the writing descriptors of writing proficiency of Bahraini university-level students.

6.2 Limitations

Several methodological limitations should be acknowledged. First, the study was confined to a single institutional context. The setting ensured standardized data collection; however, it limited the generalizability of the findings. Broader EFL populations operating under different instructional models, assessment practices, or learner demographics might not benefit as much. Second, the study relied on stratified sampling from three progressive writing levels based on their institutional placement. While this stratification facilitated meaningful internal comparisons, the limited number of samples within each level constrained the statistical power of subgroup analyses. It restricted the study's ability to detect more granular developmental trends. Taken together, these limitations suggest that the findings should be interpreted with caution. Future studies could address these constraints by incorporating larger and more diverse samples, using multiple writing tasks across genres and conditions, and conducting cross-institutional comparisons. In addition, expanding the scope of analysis to include discourse-level and rhetorical features could further enhance our understanding of syntactic maturity in L2 academic writing.

6.3 Recommendations

Based on the findings, several pedagogical and research-oriented recommendations are proposed. First, given the strong correlation between noun phrase elaboration and writing proficiency, writing instruction should prioritize explicit teaching of nominal structures, including premodifiers, postmodifiers, and embedded elements. Second, Instructional materials should incorporate contrasts between spoken and academic writing, using models from the LGSWE framework to help learners recognize and adopt register-appropriate syntactic forms. Third, feedback practices at the first

writing level should be focused on determiners, article usage, and managing phrasal density and syntactic embedding. The errors were frequently occurring at different writing levels. Fourth, future research and classroom assessments should combine tools like TAASSC with qualitative evaluations to capture both measurable trends and contextualized usage patterns. By addressing these recommendations, educators and researchers can further support EFL learners in developing the syntactic and rhetorical skills essential for academic writing proficiency.

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Appendices

Appendix A. TOEFL iBT® Test Performance Scores

A.1. TOEFL iBT® Independent Essay Rubric Adopted by Kyle (2016)

iBT/Next Generation TOEFL Test
Integrated Writing Rubrics (Scoring Standards)

Score	Task Description
5	A response at this level successfully selects the important information from the lecture and coherently and accurately presents this information in relation to the relevant information presented in the reading. The response is well organized, and occasional language errors that are present do not result in inaccurate or imprecise presentation of content or connections.
4	A response at this level is generally good in selecting the important information from the lecture and in coherently and accurately presenting this information in relation to the relevant information in the reading, but it may have minor omission, inaccuracy, vagueness, or imprecision of some content from the lecture or in connection to points made in the reading. A response is also scored at this level if it has more frequent or noticeable minor language errors, as long as such usage and grammatical structures do not result in anything more than an occasional lapse of clarity or in the connection of ideas.
3	A response at this level contains some important information from the lecture and conveys some relevant connection to the reading, but it is marked by one or more of the following: • Although the overall response is definitely oriented to the task, it conveys only vague, global, unclear, or somewhat imprecise connection of the points made in the lecture to points made in the reading. • The response may omit one major key point made in the lecture. • Some key points made in the lecture or the reading, or connections between the two, may be incomplete, inaccurate, or imprecise. • Errors of usage and/or grammar may be more frequent or may result in noticeably vague expressions or obscured meanings in conveying ideas and connections.
2	A response at this level contains some relevant information from the lecture, but is marked by significant language difficulties or by significant omission or inaccuracy of important ideas from the lecture or in the connections between the lecture and the reading; a response at this level is marked by one or more of the following: • The response significantly misrepresents or completely omits the overall connection between the lecture and the reading. • The response significantly omits or significantly misrepresents important points made in the lecture. • The response contains language errors or expressions that largely obscure connections or meaning at key junctures, or that would likely obscure understanding of key ideas for a reader not already familiar with the reading and the lecture.
1	A response at this level is marked by one or more of the following: • The response provides little or no meaningful or relevant coherent content from the lecture. • The language level of the response is so low that it is difficult to derive meaning.
0	A response at this level merely copies sentences from the reading, rejects the topic or is otherwise not connected to the topic, is written in a foreign language, consists of keystroke characters, or is blank.

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A.2. TOEFL iBT® Performance Descriptors Adopted by Kyle (2016)

1. SCA Indices

Variable	Correlation with Holistic Score
mean length of clause	0.240
coordinate phrases per clause	0.190
complex nominals per T-unit	0.124

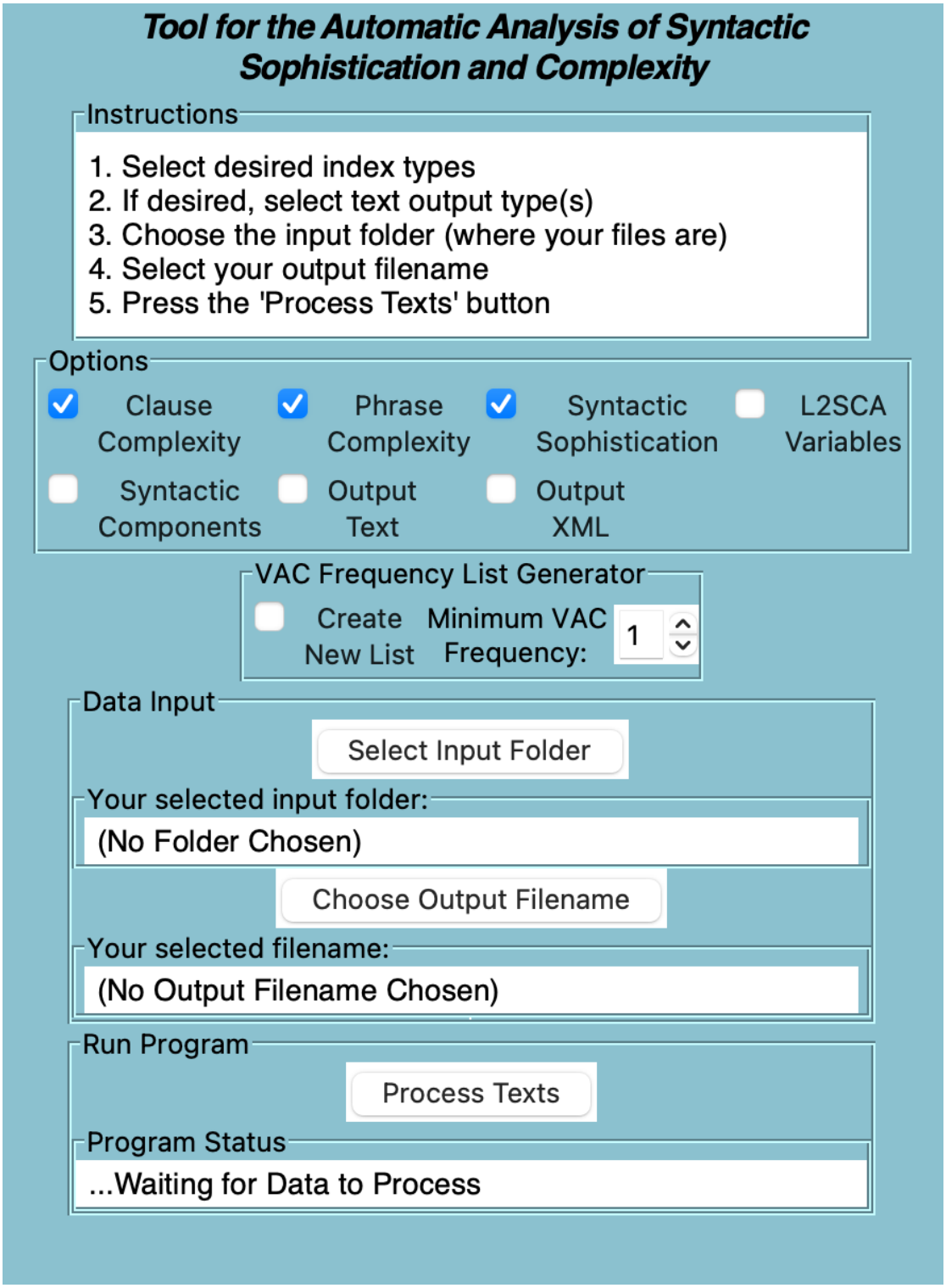
2. Clausal Complexity

Variable	Correlation with Holistic Score
nominal subjects per clause	-0.172
prepositions per clause	0.141
direct objects per clause	-0.137
dependents per clause (standard deviation)	0.128
adverbial modifiers per clause	0.116
clausal complements per clause	-0.106

3. Phrasal Complexity

Variable	Correlation with Holistic Score
dependents per nominal	0.332
dependents per object of the preposition (no pronouns)	0.290
prepositions per nominal (no pronouns)	0.288
prepositions per object of the preposition	0.287
dependents per nominal (standard deviation)	0.277
dependents per object of the preposition	0.267
adjectival modifiers per object of the preposition	0.265
dependents per direct object (standard deviation)	0.259
dependents per object of the preposition (no pronouns, standard deviation)	0.239
dependents per nominal subject (standard deviation)	0.230
dependents per direct object (no pronouns)	0.226
determiners per nominal subject	0.203
determiners per nominal (no pronouns)	0.157
dependents per direct object	-0.154
adjectival modifiers per direct object (no pronouns)	0.146
determiners per direct object (no pronouns)	0.116
prepositions per direct object	0.110

Appendix B. The Tool for Automatic Analysis of Sophistication and Complexity (TAASSC) by Kyle (2016).



B.1. SCA Indices Adopted from Wolfe-Quintero et al. (1998)

Index Abbreviation	Index Name	Index Description
MLS	mean length of sentence	number of words per sentence
MLT	mean length of T-unit	number of words per T-unit
MLC	mean length of clause	number of words per clause
C/S	clauses per sentence	number of clauses per sentence
VP/T	verb phrases per T-unit	number of verb phrases per sentence
C/T	clauses per T-unit	number of clauses per T-unit
DC/C	dependent clauses per clause	number of dependent clauses per clause
DC/T	dependent clauses per T-unit	number of dependent clauses per T-unit
T/S	T-units per sentence	number of T-units per sentence
CT/T	complex T-unit ratio	number of complex T-units divided by T-units
CP/T	coordinate phrases per T-unit	number of coordinate phrases per T-unit
CP/C	coordinate phrases per clause	number of coordinate phrases per clause
CN/T	complex nominals per T-unit	number of complex nominals per T-unit
CN/C	complex nominals per clause	number of complex nominals per clause

B.2. Phrasal and Dependent Indices

Structure	Abbreviation	Example of structure
Phrase types		
nominal subject	nsubj	*[The man in the red hat]$_{nsubj}$ gave the tall man the money.*
passive nominal subject	nsubj_pass	*[The tall man]$_{nsubj_pass}$ was given money by the man in the red hat*
agent	agent	*The tall man was given money by [the man in the red hat]$_{agent}$*
nominal complement	ncomp	*He is [a tall man]$_{ncomp}$*
direct object	dobj	*The man in the red hat gave the tall man [the money]$_{dobj}$.*
indirect object	iobj	*The man in the red hat gave [the tall man]$_{iobj}$ the money*
prepositional object	pobj	*The man in [the red hat]$_{pobj}$ gave the tall man the money*
Dependent types		
determiners	det	*[The]$_{det}$ man in [the]$_{det}$ red hat gave [the]$_{det}$ tall man [the]$_{det}$ money*
adjective modifiers	amod	*The man in the [red]$_{amod}$ hat gave the [tall]$_{amod}$ man the money*
prepositional phrases	prep	*The man [in the red hat]$_{prep}$ gave the tall man the money*
possessives	poss	*That is [her]$_{poss}$ red car*
verbal modifiers	vmod	*I don't have anything [to say]$_{vmod}$ to you*
nouns as modifiers	nn	*[Oil]$_{nn}$ prices are rising*
relative clause modifiers	rcmod	*I saw the man [you love]$_{rcmod}$*
adverbial modifiers	advmod	*We will drive the red car [tomorrow]$_{advmod}$*
conjunction "and"	conj_and	*Jack [and]$_{conj_and}$ Jill*
conjunction "or"	conj_or	*Jack [or]$_{conj_or}$ Jill*

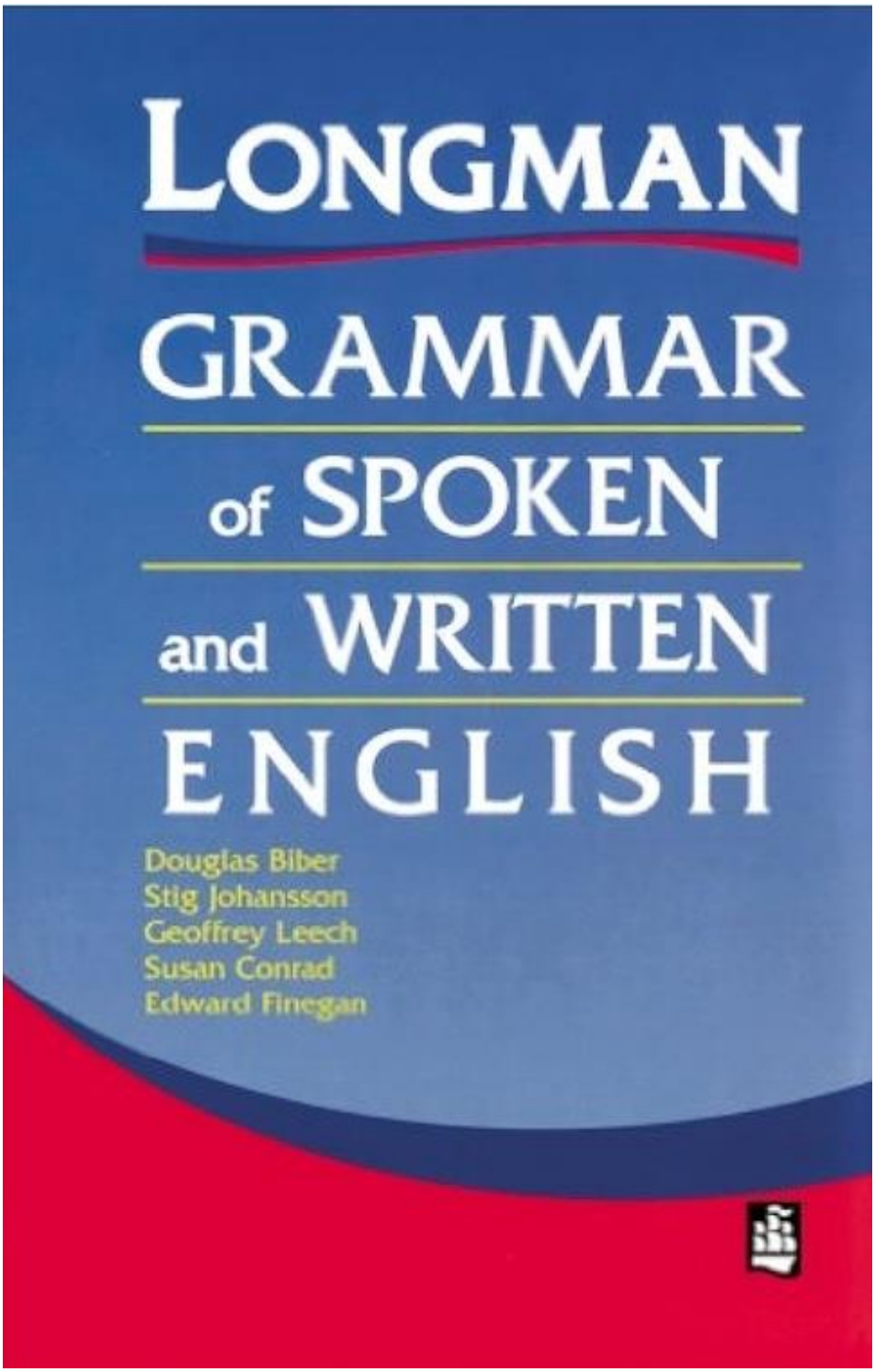
B.3. Clausal Dependent Indices

Structure	Abbreviation	Example of Structure
adjective complement	acomp	*She [looks]$_{gov}$ [beautiful]$_{acomp}$*
adverbial clause	advcl	*The accident [happened]$_{gov}$ [as night fell]$_{advcl}$*
adverbial modifier	advmod	*[Accordingly]$_{advmod}$, I [ate]$_{gov}$ pizza.*
auxilliary verb	aux	*He[is]$_{aux}$ [running]$_{gov}$*
bare noun phrase temporal modifier	tmod	*Last [night]$_{tmod}$, I [swam]$_{gov}$ in the pool*
clausal complement	ccomp	*I am [certain]$_{gov}$ [that he did it]$_{ccomp}$*
clausal coordination	cc	*[Jill runs]$_{gov}$ and [Jack jumps]$_{cc}$*
negation	neg	*He did [not]$_{neg}$ [kill]$_{gov}$ them.*
clausal prepositional complement	pcomp	*They heard [about]$_{gov}$ [you missing classes]$_{pcomp}$*
clausal subject	csubj	*[What she said]$_{csubj}$ [is]$_{gov}$ not true*
conjunction	conj	*He [runs]$_{gov}$ and [jumps]$_{conj}$*
controlling subject	xsubj	*[Tom]$_{xsubj}$ likes to [eat]$_{gov}$ fish*
direct object	dobj	*She [gave]$_{gov}$ me a [raise]$_{dobj}$*
discourse marker	discourse	*[Well]$_{discourse}$, I [like]$_{gov}$ pizza*
existential "there"	expl	*[There]$_{expl}$ [is]$_{gov}$ a ghost in the room.*
indirect object	iobj	*She [gave]$_{gov}$ [me]$_{iobj}$ a raise*
parataxis	parataxis	*The guy, John [said]$_{parataxis}$, [left]$_{gov}$ early in the morning.*
modal auxilliary	modal	*He [may]$_{modal}$ [be]$_{gov}$ awesome.*
nominal complement	ncomp	*He [is]$_{gov}$ a [teacher]$_{ncomp}$*
nominal subject	nsubj	*The [baby]$_{nsubj}$ [is]$_{gov}$ cute*
open clausal complement	xcomp	*I am [ready]$_{gov}$ [to leave]$_{xcomp}$*
agent	agent	*The man has been [killed]$_{gov}$ by the [police]$_{agent}$*
passive auxilliary verb	auxpass	*Kennedy has [been]$_{auxpass}$ [killed]$_{gov}$*
passive clausal subject	csubjpass	*[That she lied]$_{csubjpass}$ was [suspected]$_{gov}$ by everyone*
passive nominal subject	nsubjpass	*[Dole]$_{nsubjpass}$ was defeated$_{gov}$ by Clinton*
phrasal verb particle	prt	*They [shut]$_{gov}$ [down]$_{prt}$ the station*
prepositional modifier	prep_	*They [went]$_{gov}$ [into the store]$_{prep_into}$*
subordinating conjunction	mark	*Forces engaged in fighting [after]$_{mark}$ insurgents [attacked]$_{gov}$*
undefined dependent	dep	*N/A*

B.4. Finite & Non-Finite Indices Adopted from Biber et al. (2011)

Category	Index
Finite adverbial clauses	
	Total finite adverbial clauses
	Because clause
	If clause
	Although clause
Finite Complement Clauses	
	verb + *that* clause
	verb + *WH* clause
	adjective + *that* clause
	noun + *that* clause
Finite noun modifier clauses	
	that relative clauses
	WH relative clauses
Nonfinite adverbial clauses	
	to adverbial clause
Nonfinite complement clauses	
	verb + *-ing* clause
	verb + *to* clause
	adjective + *-ing* clause
	adjective + *to* clause
	noun + *of* + *-ing* clause
	noun + *to* clause
Nonfinite noun modifier clauses	
	nonfinite relative clause
Adverbials	
	adverbs as adverbials
	prepositional phrases as adverbials
Noun modifiers	
	attributive adjectives
	nouns as nominal premodifiers
	total prepositional phrases as nominal modifiers
	of as postmodifier
	in as postmodifier
	on as postmodifier
	with as postmodifier
	for as postmodifier

Appendix C. Longman Grammar of Spoken and Written English Biber et al. 1999



C.1. Syntactic Register-based Features

Register Features	Academic	Conversational
Clause Types	**Syntactic features:** Subordination, embedding, use of relative and complement clauses	**Syntactic features:** Simple or coordinated main clauses
Passive Constructions	**Syntactic features:** Frequently used to emphasize results or processes	**Syntactic features:** Active constructions dominate.
Noun Phrase Complexity	**Syntactic features:** Premodification and post modification; dense noun phrases	**Syntactic features:** Simple noun heads. Pronoun substitution
Nominalizations	**Syntactic features:** Frequent use of abstract nouns derived from verbs	**Syntactic features:** Preference for verbs instead of noun forms
Non-finite Clauses	**Syntactic features:** Infinitive and participial clauses used as modifiers or complements	**Syntactic features:** Limited use; reliance on full finite clauses
Prepositional Phrase Use	**Syntactic features:** Complex postmodifiers within noun phrases	**Syntactic features:** Simple or limited PP use

Sentence Length	**Syntactic features:** Longer sentences due to layering of clauses and phrases	**Syntactic features:** Shorter, linear sentence construction
Grammatical Accuracy	**Syntactic features:** Accurate use of articles, agreement, modifier placement	**Syntactic features:** More tolerance for omission or inconsistency

C.2. Syntactic Register-based Errors

Register	Register-Based Feature	Error Clarification
Conversational	Run-on sentences	Independent clauses combined without appropriate subordination or coordination markers.
Conversational	Article misuse	Misuse or omission of definite/indefinite articles, leading to grammatical inaccuracy.
Conversational	Verb–noun mismatch	Agreement errors where verbs do not match in number with their subjects.
Conversational	Pronoun ambiguity	Unclear or inconsistent pronoun reference leading to confusion about antecedents.
Conversational	Fragmented clauses	Incomplete or fragmented clauses lacking a subject or main verb.
Conversational	Overuse of coordination	Excessive reliance on coordinating conjunctions (e.g., 'and', 'but') instead of subordination.
Conversational	Simple sentence reliance	Frequent use of simple clauses without embedding or subordination, limiting syntactic variety.
Academic	Over-embedding	Excessive layering of dependent clauses within a single sentence, reducing clarity.

Academic	Nominalization errors	Awkward or incorrect use of nominalized forms, making sentences dense or unclear.
Academic	Complex noun phrase errors	Misuse or overextension of premodifiers/postmodifiers in noun phrases.
Academic	Relative clause misuse	Improper or unclear use of relative clauses, affecting precision and cohesion.
Academic	Passive construction misuse	Unnatural or inaccurate use of passive voice, leading to awkward phrasing.
Academic	Rare determiner errors	Misapplication of quantifiers/determiners in complex academic structures.

الملخص

تستقصي هذه الدراسة العلاقة بين التعقيد النحوي وكفاءة الكتابة في نصوص متعلمي اللغة الإنجليزية كلغة أجنبية (EFL) عبر ثلاثة مستويات من الكفاءة: المتوسط، وفوق المتوسط، والمتقدم. استخدمت الدراسة أداة التحليل التلقائي للتعقيد والتطور النحوي لتحليل (TAASSC) مؤشرات التعقيد النحوي في نصوص الطلاب. تم مقارنة هذه المؤشرات إحصائيًا عبر مستويات الكفاءة المختلفة، كما تم فحصها فيما يتعلق بالدرجات الكلية لكتابة TOEFL لتقييم صلاحيتها التشخيصية. وأجرت الدراسة تحليلًا دقيقًا لأنماط الأخطاء النحوية المتكررة والتحولات التطورية في الكثافة النحوية بين الجمل والعبارات. وقد استُرشد في ذلك بنموذج قواعد اللغة المنطوقة والمكتوبة من لونغمان (LGSWE). كشفت النتائج عن انتقال من التراكيب المعتمدة على الجمل إلى التراكيب المعتمدة على العبارات في نصوص المستوى المتقدم، إلى جانب انخفاض ملحوظ في تكرار الأخطاء النحوية. تسهم هذه النتائج في إثراء الأدبيات المتنامية حول التحليل النحوي الآلي في سياقات اللغة الإنجليزية كلغة أجنبية، وتؤكد على أهمية دمج المقاييس البنيوية والمبنية على الاستخدام في تقييم وتعليم الكتابة.

الكلمات المفتاحية :كفاءة الكتابة، مؤشرات التعقيد النحوي، الأخطاء النحوية، ، الدرجات الكلية لكتابة TOEFL، نموذج LGSWE

جامعة البحرين
كلية الآداب
قسم اللغة الإنجليزية وآدابها

دراسة الكتابة الأكاديمية: تطبيق التحليل النحوي للجمل المعقده

أطروحة مقدمة كجزء من متطلبات الحصول على درجة الماجستير في الدراسات التطبيقية للغة الإنجليزية

إعداد

حصة أحمد يحيى النجار

الرقم الأكاديمي:

٢٠١٤٢٦٥٣

بإشراف

د. مدني عثمان عبدالله

يونيو ٢٠٢٥